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NEWS DIGEST

Domestic

Continued cutback in airline flight schedules was the outlook last week because of the oil strikes, despite settlement with Sinclair. The strikes already have cost the equivalent of more than a month's supply of civil aviation gas. PAD Administrator and Interior Dept. Secretary Oscar Chapman says that, "No matter what happens in the petroleum strikes, limitations will have to be continued for some time." PAD restrictions aim to cut airline operations back 30%. (American Airlines said that if there was no relief, the carrier would have to cut schedules over 50% beginning last weekend.) PAD has relaxed some of its restrictions for West Coast, Alaskan and Hawaiian operators and lifted all bans in connection with farm and forest work.

EAL has renewed efforts to acquire Colonial Airlines by exchange of stock after NWA minority stockholders succeeded in blocking Northwest-Colonial merger. NWA vote was 716,835 in favor, 167,995 against. According to Minnesota law a two-thirds affirmative vote of total outstanding stock would be needed to approve the merger. Eastern President and General Manager Capt. Eddie Rickenbacker announced that EAL's directors have authorized the company to negotiate with Colonial.

United Air Lines has ordered 15 Douglas DC-7s, with negotiations not yet settled on delivery dates, options to buy more DC-7s and other details of the transaction.

Personal and executive plane shipments by six companies during March totaled 175 one-to-ten place craft valued at $1,588,000. There were 148 planes of four or more places and 27 one-and-two-place aircraft.

Pan American has ordered three Douglas DC-6A Liftmaster cargo planes for delivery in early summer of 1954. It is expected that the new planes will replace the DC-6As PAA is now leasing from Slick for cargo service from New York to London and San Juan.

Electronics division, Curtiss-Wright Corp., Carlstadt, N. J., will close its factory and offices for vacation from July 26 to Aug. 11.

Brig. Gen. Floyd B. Wood has assumed his new duties as assistant deputy for development at Headquarters, Air Research and Development Command, Baltimore. He previously had been assigned as chief of staff at Wright Air Development Center, Dayton.

COMING IN TO ROOST at their new home are Bell 47-Ds led by an H-12B approach Bell Aircraft's recently completed rotary wing plant at Hurst, Tex. The copters were ferried from the former Globe Aircraft Co. facility at Saginaw, Mich., where Bell had been producing copters until the new factory was ready.

Financial

Flying Tiger Line reports revenues of $433,000 for April, a 23% increase over a year ago. Total air freight revenues for the first four months of this year were $1,784,000, up 12% over last year.

United Aircraft Corp. and domestic subsidiaries note $144,518,873 in shipments for the quarter ended Mar. 31. Net income after taxes and subject to government renegotiations was $3,745,368. Contracts, orders and letters of intent at Mar. 31 totaled approximately $1,340,000,000.

Seaboard & Western Airlines reports net earnings of $132,184 after tax provision, on earnings of $2,831,973 for the first three months of 1952. Last month the carrier logged 569,100 revenue miles, flying 2,913 revenue hours in military and commercial operations over the Atlantic and Pacific. Operations were up 11% over the same month last year.

Mid-Continent Airlines had a net loss of $20,784 for March, with net loss for the first quarter being $82,544. Operating revenues during the quarter were $2,406,753, up nearly 11% over the previous year's period.

Lockheed Aircraft Corp., Burbank, Calif., had net earnings of $1,057,704 during the first quarter of 1952 on total business of $89,981,630. Backlog at the end of March totaled $1,576,485,000.

Eastern Air Lines earned a net profit of $963,886 after taxes, with April earnings substantially higher than March, which has been the carrier's peak month heretofore.

International

Canadair Ltd., Montreal, is building 350 F-86 Sabre fighters for North Atlantic Treaty Organization and reportedly is also making some Sabres for the U.S.

Japanese Cabinet has approved legislation authorizing production of aircraft in Japan and it is expected that Parliament will debate it soon.

English Electric Canberra twin jet bomber set a new flight mark of 23 mr. 5 mm. from London to Melbourne, Australia, 10,401 nautical mi. Flight took 1 hr. 15 mm. less than previous Canberra hop.

R. D. MacDonald, Canadian Dept. of Defense Production Branch representative in Washington, has been appointed assistant director of the Aircraft division.

AVIATION CALENDAR

May 28—Institute of the Aeronautical Sciences, Boston Section, Annual Dinner Meeting Thomson Club, Nahant, Mass

May 28-June 1—Wright Memorial Glider Meet, South Dayton Airport, Dayton

May 31—Philadelphia Aviation Country Club annual spring regatta, Wings Field, Ambler, Pa.

June 1-3—Airport lighting conference and seminar, sponsored by American Association of Airport Executives, Deshler Wallick Hotel, Columbus, Ohio

June 1-6—Society of Automotive Engineers summer meeting, Ambassador and Ritz-Carlton Hotels, Atlantic City, N. J.

June 3—Council for military aircraft standards, Aircraft Industries Assn., meeting, Hotel Statler, New York

June 4-6—California Association of Airport Executives & California Aviation Trades Assn conference, Stockton, Calif

June 9-13—National Fire Protection Assn annual meeting, aviation seminar on June 10, Hotel Statler, New York.

June 15-19—American Society of Mechanical Engineers semi-annual meeting, Sheraton Gibson Hotel, Cincinnati

June 16-17—Aviation Distributors and Manufacturers Assn mid year meeting, The Grand Hotel, Mackinac Is., Michigan

June 17-19—Aircraft Trade Shows international exhibit of aircraft parts and equipment, Hotel Park Sheraton New York.

June 19-21—American Society of Mechanical Engineers symposium on shock and vibration instrumentation, Pennsylvania State College, Pa

June 24-26—Ignition and engine analyzer conference, sponsored by Scintilla Magneto division, Bendix Aviation Corp., Sydney, N. Y.

July 8-12—Aviation Writers Assn annual convention, Ambassador Hotel, Los Angeles

July 16-18—Institute of the Aeronautical Sciences annual summary meeting, IAS Western Headquarters Building, Los Angeles.

Sept. 2-7—Society of British Aircraft Constructors annual display, Farnborough, England.

Sept. 15-19—International Air Transport Assn. eighth annual general meeting, Geneva, Switzerland

PICTURE CREDITS

1—Bell Aircraft; 9—(F-86F) North American Aircraft; (F2H-3) McDonnell Aircraft; (F-84G) E. J. Pulhan; 10—Boeing Airplane Co.; 28—Central Press Photos Ltd.; 38—McGraw-Hill World News; 46—Boeing Airplane Co.; 48—AiResearch; 58, 61—MATS; 66—General Electric; 83—RBA

NEW SABRE JOINS USAF—Latest North American Sabre fighter model the F-86F, leaves the ground for the first time at Columbus, Ohio, prior to delivery to USAF. Fitted with J-47-GE-27 engine putting out over 5,800 lb. thrust, the F-86F does better than 650 mph at sea level.

New Views of Military Jets

LATEST BANSHEE—New McDonnell F2H-3 Banshee (left) has longer fuselage, improved radar, more powerful armament and greater fuel capacity than previous Banshees. It can be distinguished from the earlier models by its new tail horizontal surfaces having marked dihedral and being set lower than other Banshees. The cockpit canopy also appears to be larger. The new F2H-3 is in production for the Navy at McDonnell Aircraft Corp.'s plant at Lambert-St. Louis Municipal Airport.

AID TO OUR ALLIES—A shiny new Republic F-84G Thunderjet (right) fitted with four 230-gal. auxiliary fuel tanks just prior to shipment overseas under Mutual Defense Assistance Pact to a North Atlantic Treaty Organization nation. A considerable quantity of these late model fighter-bombers, fitted for air-to-air refueling, are earmarked for our allies, and are also being supplied to USAF. The new F-84G has replaced the F-84E on the company's production lines at Farmingdale, L. I., N. Y.

TURBOPROP PLUS JET—The Bregnet 960 Vultur (left) two-seater carrier based attack fighter is powered by an Armstrong Siddeley Mamba turboprop engine turning the small-diameter prop, also has a Hisso Nene turbojet mounted in aft fuselage to provide extra bursts of speed when needed. The 960 is being tested by the French Navy. A later version, the 961, is a single-place craft.

WHO'S WHERE

In the Front Office

Douglass F. Johnson, previously executive vice president of Aircraft Engineering & Maintenance Co., Oakland, Calif., has been named president of the Transocean Air Lines' subsidiary. Johnson has been sales director for TAL since its founding in 1946

Colin H. McIntosh has resigned as vice president-operations, All American Airways, effective June 15. McIntosh, who has not disclosed his future plans, joined All American in 1948.

Andrew F. Haidnek, Lear, Inc vice president, is assuming the duties of general manager of the firm's Grand Rapids division, replacing **A. G. Handschumacher**, Lear, Inc. vice president who has been named to the new post of director of sales for the corporation with headquarters in the LearCal division, Los Angeles. In other Lear moves, **Harold C. Andrus** has been promoted to general manager of the Lear Romec division, Elyria, Ohio and **LeRoy Barr** to assistant general manager of Lear Romec

W. C. Whitehead has been named acting general manager of the Garrett Corp., Los Angeles, in the absence of **J. C. Garrett**, president, who is taking an extended rest. Whitehead, who has been with the company since it was established in 1936, will continue his responsibilities as vice president and manager of the firm's Airsupply division.

Changes

R. K. Brown has been designated assistant manager of the Wright Aeronautical sales department and will continue to act as assistant secretary of Curtiss-Wright Corp. **John N. McDonald** is taking over Brown's former post as manager of the Order and Contract division

D. O. Woods has been appointed superintendent of technical departments, Lockheed Aircraft Service, Burbank

Paul F. Voigt Jr., stainless steel industry pioneer, has joined Solar Aircraft Co., San Diego as consultant to the president on marketing methods and new product development. **Elliot C. Bacon** has been designated assistant manager of the firm's Research Products division.

Lewis A. Nelson, with Northrop Aircraft Inc., Hawthorne, Calif., since 1950, has been named supervisor in charge of the firm's engineering test pilots

Arthur D. Jairett has been appointed manager of the tooling department of Fairchild Aircraft division, Hagerstown, Md

Lowery L. Brabham, formerly director of military requirements for Republic Aviation Corp., Farmingdale, L. I., N. Y., has been made the firm's sales manager, succeeding **Henry Lane**

John F. Davidson has been named assistant general manager for California Eastern Airways Inc

John R. Starr has transferred from Goodyear Tire & Rubber Co.'s Detroit district office to the sales division of Goodyear Aircraft Corp., as contract administrator in the government projects department

INDUSTRY OBSERVER

► **Britain's de Havilland enterprise recently announced that its aviation products (airplanes, engines and propellers) are currently operating in 62 countries and in 33 national air forces, and that since the end of World War II export business has totaled £60 million (about $170 million).**

► Military sources say Convair's sweptwing eight-jet B-60 has shown good enough performance in its first flights that its chances for procurement in quantity are much improved. The YB-60 may be ordered into production sooner than had been anticipated. Meanwhile, Boeing's B-52 eight-jet bomber, continues programmed for more than 30 reconnaissance RB-52 planes

► Powerplant requirement for the new TX trainer competition is giving Air Force and manufacturers considerable headaches. Requirement of 1,000-mi. range with no external fuel tanks, plus light weight and climb and speed requirements are tough to fill. One Air Force suggestion is to make a turbojet out of an Allison T38 by taking off the gearbox and propeller. Rough calculations are that they could get an 800-lb. engine that would deliver nearly 2,000 lb. thrust by such an expedient

► Noise factor in the new Kaman Navy experimental K-225 helicopter, powered with the little Boeing gas turbine, is appreciably less than in the same copter powered by piston engine. Movie soundtracks played for the American Helicopter Society demonstrating this fact are strictly on the level, without any "fudging," Kaman officials attest

► Experimental operations of a Bell helicopter equipped with ski-attachments fitted to its skid gear have been of considerable benefit to powerline patrolling in remote areas in Ontario, Canada, where the copters otherwise would sink in deep snow.

► Twin Coach Co. Aircraft division, Buffalo, is expected to start making fuselages for the Army's H-25 helicopter as well as the Navy HUP counterpart

► An industry-wide program to determine requirements for spot and fusion welding of titanium and to establish characteristics of the welds and methods of testing is being undertaken by Aircraft Industry Association's Aircraft Research and Testing Committee.

► Washington straws in the wind point to increased interest in a giant-sized military transport, probably an up-to-date development of the Convair XC-99. The record the big plane has been piling up in hauling big loads long distances finally got more than passing notice when it came into Washington nonstop from the West Coast hauling 85,000 lb. of cargo, as part of the Armed Services Day celebration. A production version probably would be turboprop-powered with a swept wing arrangement similar to the B-60.

► A de Havilland claim that its Ghost-powered Venom jet night fighter "far outclasses any other contemporary two-seat radar-equipped fighter in this country or elsewhere" offers an interesting challenge to such craft as the USAF's Northrop F-89 Scorpion and Lockheed F-94C, the RCAF's Avro CF-100 Canuck and Russia's two-seat radar-equipped version of the MiG-15, now reported on duty in Eastern Germany.

► Next step in the Wright Air Development Center's helicopter towing program for extending range probably will be an air hook-in by the helicopter to a fixed wing aircraft, something like the McDonnell XF-85 parasite tests. However, the helicopter hook-on contemplates pulling the helicopter in and carrying it pick-a-back on the fixed wing transport.

► Installation of the Wright R1820-103 engine in the Piasecki H-21 gives the new helicopter the most powerful powerplant yet used for helicopters in the U. S., and follows approximately a year and a half of test and adaptation work by Wright. While the first H-21s are getting 1,150 hp. for takeoff, later transport types will have later engines rated at 1,425 hp.

Washington Roundup

Newcomer to JCS?

Commandant of the Marine Corps will get a reserved welcome from the other members if he becomes a member of the Joint Chiefs of Staff.

Army, Navy and Air Force are fighting all-out against the move. But the House, by a whopping 253 to 30, has voted for it.

The legislation—which also sets a "floor" on Marine strength of three divisions and three air wings and authorizes up to four divisions and four wings—has its origin in periodic overtures by USAF and Army to take over the Corps.

Opposed every inch of the way by the Secretary of Defense and the top brass of the three major services, the measure classifying the Corps as a "separate" service with non-transferable functions is now finally set for enactment—unless vetoed by the President. It is just a question of working out differences between House and Senate versions.

• **Senate set a "floor"** of four divisions and four air wings; the House set a "floor" of three divisions and wings, but authorizes up to four.

• **Senate wants to make the Marine commandant a "consultant"** to the JCS, the House, a full-fledged member.

Here are reasons behind Army Navy USAF opposition:

• It means less money for the three major services. In these days of budget ceilings, if there is a floor on Marine strength, it means that the Marine slice of the money pie is fixed—and the other three services will have to wrangle over what's left. Neither Army, Navy nor USAF have a "floor" strength in law.

• Not only will a large Marine Corps probably mean less money for Naval Aviation, but out of its money Navy will have to support additional Marine strength with additional carrier facilities and additional procurement services by BuAer.

• Army thinks an airborne Army—not seaborne Marine detachments—is the answer to meeting aggressive out bursts over the globe, as the U. S. is obliged to do under the policy of "containing" Russia.

USAF, long critical of dissipating U. S. military strength in fringe wars, sees Strategic Air Command as U. S.'s "in readiness" force and the top candidate for a "floor" strength. Rep. Gary Clemente observed: "The Strategic Air Command has responsibilities calling for a far greater degree of readiness than the Marine Corps and calling for a greater degree of independence in its preparation and training. Certainly, if a floor is to be put under any unit, SAC should be the organization to have it. It takes many years to create and it must be over the heart of enemy territory just a few hours after any war begins. SAC also will be justified in seeking membership on the Joint Chiefs of Staff."

No Reserves

Administration's program for a 143-wing USAF and 16 air-carrier-group Navy makes no provision for reserve aircraft.

This means that in an all-out war the U. S. would be able to strike a mighty first blow, but the following blows would be of diminishing weakness for several months—until production tempo was stepped up to meet, and then surpass, replacement requirements.

New Navy Point

Watch for Navy spokesmen to start hitting at this new point in their bid for recognition for Naval Air.

One carrier vs. one land base doesn't draw the issue correctly. All the land-based air the U. S. has and plans to have at strategic points over the globe would be useless, they contend, if the U. S. were forced to meet aggression at a point beyond their range area. Only mobile carrier air can meet aggression anywhere.

So far, Navymen have been stressing these two arguments:

• The invulnerability of the carrier. Outgoing Deputy Chief of Naval Operations for Air, Vice Adm. John Cassady commented: "The only place a carrier is vulnerable is in Washington."

• Land bases involve political intrigue and strings, can be captured and used against the U. S.

New Hope for Air Funds

• Massachusetts Sen. Henry Cabot Lodge will make an attempt to get funds for USAF procurement over and above the $12.6 billion recommended by the Administration when the 1953 fiscal year military budget comes up for Senate action. House chipped the figure to $12.1 billion.

Sen. Joseph O'Mahoney, chairman of the Defense Appropriations Subcommittee, long a USAF booster, is veering toward Naval Air. "The carrier has its points of vulnerability. But it can't be said that land bases in foreign countries are invulnerable. Their weakness is that they are constructed on foreign territory so there are political aspects." House banned the construction of a second 60,000 ton flush-deck carrier and the matter is now before O'Mahoney's committee.

CAA's Critics

Critical speeches against Civil Aeronautics Administration, touched off by recent crashes, continue on Capitol Hill.

• **Senator John Bricker:** With CAA, "repeated violations of air safety regulations are punished by only a mild rebuke until there occurs a major tragedy which compels the action which should have been taken many months before."

• **Rep. Robert Ross:** "In suspending the operations of Robin Airlines after the crash of its C-46, Mr. Charles Horne, the CAA Administrator, said that 'the emergency suspension is predicated upon an operation history involving violations of Civil Air Regulations.' If the operating company was guilty of a series of violations of safety regulations why did the CAA permit them to continue to operate?"

Ross has introduced a resolution authorizing House Interstate and Foreign Commerce Committee to investigate "why the Civil Aeronautics Board and the CAA have failed to establish and enforce adequate safety regulations for the protection of the public and the airline industry."

Sen. Bricker and Sen. Robert Henderson are pushing for a CAA investigation by Senate Interstate and Foreign Commerce Committee.

—Katherine Johnsen

AVIATION WEEK VOL. 56, NO. 21 MAY 26, 1952

Outlook for Air Power Abroad

Lack of Money Menaces Anti-Red Buildup

- **AF production stretchout will give us plane-less bases in Europe and increase our air inferiority.**
- **Reduction in MDAP funds will cripple ability of Europeans to strengthen own aircraft industries.**
- **And both England and France have internal money problems that make it necessary to lean on U. S.**

By William Kroger

Paris—The world is facing a crisis in the cost of preventing Russian aggression.

The race to secure Europe from the threat to the east is proceeding with impressive effectiveness on policy, planning and operational levels. Yet, a study of the work in the three centers of U. S. effort, London, Frankfurt and finally here, discloses one factor alone that threatens to nullify the most earnest efforts of the diplomats, generals and aircraft builders.

It is money.

► **The Big Question**—With increasing worry, Washington, London, Paris and Frankfurt must ponder this question: Can even the U. S.—at the highest income level in its history—afford the price of European security?

Money is the key topic no matter where you go or to whom you talk.

The crisis in the cost of world safety starts on the American side of the ocean with the proposed cuts in the budgets of the U. S. Air Force. The stretchout in U. S. aircraft production is viewed in Europe even more seriously than in the States—if that is possible. It has two drastic effects above all others.

• **Bases but no planes.** Despite the lag in construction of air bases in France for the Allied Air Forces of Central Europe (AAFCE), some work is being done, plans for deployment of various air units are firm and by 1954 the number of bases should meet requirements.

But present U. S. production schedules will not deliver the planes to man those bases by 1954.

• **Air inferiority.** The shocking fact to Americans steeped in a tradition of air power superiority is that not even AAFCE, let alone the U. S. Air Forces in Europe (USAFE), have either quantitative or qualitative air superiority or will have in the next few years. USAFE, as will be developed in a later report, is alert, well-trained and making the most of what it has. But the wistful eagerness of its top command for the latest type planes is inferential testimony to USAFE's position.

As of now, the Royal Air Force over which so many tears have been shed in the U. S., is the largest component of AAFCE.

The U. S. role in the money crisis does not end with the Air Force budget cuts. Of as much importance are the proposed cuts in the foreign aid program. The foreign aid funds that go into the Mutual Defense Assistance Program will be the barometer of the effectiveness of British, French and German industry in the European defense pattern.

► **Off-Shore Buying**—MDAP funds are used in two principal ways: purchase in the U. S. of planes and other munitions and equipment for foreign governments, purchase abroad of such material under the "off shore procurement" program.

In the long run, off-shore procurement is likely the most effective of the two devices as it builds an aircraft industry here in Europe that eventually can lift the load off the shoulders of the U. S. taxpayer. The program is now only getting off the ground, as will be shown in a later report. The gigantic planning necessary to make it productive is about complete. The main lack is money.

Officials concerned with off-shore procurement refuse to talk about how much money is available for buying aviation items abroad. It is too complicated, they say. But informed observers say the real reason is that if the figure were known it would be too discouraging to European industries and governments. A good guess would be that in the current fiscal year only a little more than $100 million can be spent on aviation off-shore procurement.

► **Program in Danger**—Proposed cuts in foreign aid in the forthcoming year imperil one of AAFCE's most cherished plans.

This is to underwrite the cost, and thus obtain rapid production otherwise impossible, of three French planes—the night version of the Marcel Dassault MD 452 Mystere jet fighter, the Nord 2500 cargo transport and the super secret Leduc ramjet fighter—and one extremely promising French jet engine, the Atar 101 Mk. 1.

A third aspect of the money crisis involves the political and economic conditions of the major countries in Europe. After an intensive two-week series of talks with government, military and industry leaders in Europe, the underlying situation can be summarized:

England

England is slowly regaining its economic feet, although still languishing in genteel poverty. Nothing affects the English spirit to defend its tight little isle and it is getting by on what it has. There is still the inclination to keep production going on admittedly obsolescent aircraft because it is the cheapest thing to do.

► **No Unemployment**—There is no unemployment in England and practically no luxuries for the home market. The battle of dollars is still being waged grimly with little immediate success in sight. You can wash out any immediate high volume production of acknowledged superior aircraft such as the delta wing fighters. To produce them would mean diverting men, materials and money from production of goods for export. The government could not, even if it dared, divert those three elements from home production. There is no fat in the English economic system for the home folks.

A sample of Britain's plight: It is producing in volume the Avon jet engine. The Sapphire is a higher-powered engine. But the Sapphire production will proceed at a few units a month because the British think it

can be brought along to even higher powers. There is not enough money to produce both Avon and Sapphire in quantity. British sources say that this year Curtiss-Wright will produce more Sapphires than Armstrong-Siddeley—a remarkable testimony to the low level of Sapphire production in Britain.

► **Political Trouble**—Politically, the Tory government of Winston Churchill is in growing trouble. The bulk of the working class seems inclined toward the Laborites and—what is even more significant—to the Aneurin Bevan class of Laborite. And Bevan would sacrifice arms expenditures first even before considering any reduction in civilian production.

France

At least temporarily, France is a source of genuine encouragement to AAFCE planners. For the first time in many years it has a right-wing government and some measure of economic and political stability. This situation may last throughout the summer. The government of Antoine Pinay can expect stronger opposition in the fall when the Assembly (corresponding to the House of Representatives) reconvenes.

Meanwhile, the franc is more stabilized than it has been for years, and Pinay seems successful in his efforts to balance the budget. You sense a new spirit in France. As recently as two months ago, travelers were convinced the French would not fight if war broke out. That no longer is true, at least as far as the French air force is concerned.

► **Money Tight**—But the fight to control inflation (which is succeeding) and balance the budget has inevitably made money tighter than ever. As of last week, manufacturers were marking time on production of planes the French government has decided to buy. No funds will be available until next month. The French aircraft industry, as will be described in a later story on a large manufacturer, is pathetic in its state of lack of tools, but is not particularly worried. Labor is so cheap high tooling would not pay.

The French government may be guilty, as charged, with dragging its feet on air base construction. But its problem is an essentiality of the French character: love of land. It is politically difficult, if not unwise, to requisition farms for air bases even though food production this year is no problem (France will have an exportable food surplus). This French trait is the reason AAFCE headquarters is at Fontainebleau, some 40 miles from Paris, and SHAPE headquarters at Villacoublay, 20-some miles from Paris. Paris already has been declared an open city in event of war.

Germany

Western Germany is the most prosperous country in Europe. Forbidden to manufacture planes and other arms, its hard goods industries are spewing forth high-quality autos, refrigerators, radios, sweepers, washers, etc., at a rate that threatens to engulf European and British markets throughout the world.

As one cynical American administrator says, "If we don't make these people build arms they are going to have more prosperity here than in the U.S."

But political observers will tell you it's an industrial empire built on sand. The industrialists are getting richer, the workers poorer. The labor unions are ineffective. There is an undercurrent of communism in industrial areas that seems to assure that the Essen riots of a few weeks ago were not isolated manifestations.

► **British Backing**—Consensus is that the German industrialists do not want war work, both because present profits are so high and because they are afraid of a possible Russian victory and future retaliation. But that does not apply by and large to former aircraft firms. They are begging for permission to build planes. They will get it.

Britain will back German rearmament because of the threat to its export trade. The French and Dutch in particular are unhappy at the prospect, but can't block it. Americans are calling the shots in Germany and some important U.S. overseers are enamored with the quality and quantity of German production. Their fascination can be explained only in terms of a long absence from home and a dim memory of U.S. production.

With proper qualification—establishment of an independent Western Germany and no war—there will be German air units flying with AAFCE within two years.

Safer Airports Urged in Report

Doolittle Commission also stresses need for cockpit changes; cities may resist suggested new controls.

By F. Lee Moore

There will be a big modernization program ahead for airport construction and airliner cockpit equipment if government and industry act on recommendations of the President's Airport Commission, headed by Lt. Gen. James H. Doolittle (USAF, ret.).

But airport managements are expected to fight federal certification of airports—as a further extension of red tape from Washington to the local hangar. And state and municipal governments are expected to resent any sign of federal pressure on them to curb residential construction in airport approaches.

► **Talks Start**—Air Transport Assn. made no comment when the report came out—but airlines operations vice presidents started talking it over in their conference at the Mark Hopkins Hotel, San Francisco, last week.

According to the Doolittle Commission, this is about the last opportunity to modernize city airport planning; unless prompt action is taken air transport may be choked by its own growth in size and speed.

And transport airplane cockpits, too, are getting more congested and less "fail-safe," the commission report warns.

In a report to President Truman, the commission singled out specific cases of government and industry delays where corrective action is called for. Yet the summary of the Commission's recommendations appeared generalized and considerably toned down from the full report's contents.

In its program to improve safety around airports and their cities, the commission includes both aircraft and airport recommendations.

► **The Aircraft**—The commission urges immediate steps to make aircraft components and controls "fail-safe." That means one failure of equipment or pilot should not be able to bring about disaster.

Doolittle puts it this way: "A short circuit in the propeller control, for example, must not start a chain reaction which will result in the propeller suddenly reversing in flight." (Absence of fail safe prop reversal caused the recent fatal National Airlines crash in Elizabeth, N. J., CAB announced this month.)

Manufacturers, airlines and civil aeronautics authorities are called upon to standardize transport cockpits and simplify them to relieve the crew of routine duties. Because of the expense of converting to standard, this issue has been delayed too long, the commission indicates.

Then the commission asks civil aeronautics authorities to require the airlines to buy "flight simulators" to train pilots in emergency procedure.

Airport Safety Summary

Here is the President's Airport Commission summary of recommendations for safety and noise control around airports. The commission report doesn't name the agencies to do the various jobs because the report is addressed to the President alone. Congress, agencies or industries that normally would be assigned to carry out each recommendation are specified by AVIATION WEEK.

Where community control of land is involved, the commission notes that "traditionally the power to control the use of land rests with the states and may be delegated to counties and local communities."

As to control of the air, the commission says it believes CAA and CAB have control, under the Civil Aeronautics Act, but amendments to the Act may be needed.

Where community cooperation lags, the commission suggests CAA withhold federal airport aid, or threaten to close or down-grade the airport. Specific recommendations made:

- **Congress grant federal aid** for local airport improvements when local governments put up matching amounts, as provided in the Federal-Aid Airport Act.
- CAA limit granting of federal aid to projects in line with the following recommendations of the commission.
- Clear land 1,000 ft. beyond each runway end—removing all obstructions, lengthen main runway, too, if possible.
- **Zone approach** areas, restricting new construction in fan shaped zones from runway end out—two miles deep and spreading to 6,000 ft. wide at far end. Limit new construction height and prevent use for public assembly.
- Clarify federal, state, local legal authority to regulate aircraft use of air space.
- CAA define navigable air space for approach and takeoff.
- CAA control all traffic in high-density areas, regardless of weather.
- CAA raise visual weather minimums for maneuvering under the overcast on visual contact.
- CAA raise allowable crosswind component for takeoffs and landings. Present transports are certificated for crosswinds as follows: Stratocruiser 40 mph., Super Constellation 35, DC-6, Convair, Martin 30, Constellation 20, and DC-3 15 mph. In practice, lower crosswinds have been allowed at most airports and by most airlines.
- **Develop crosswind swivel landing** gear faster than it is coming along at present.
- **Build single-runway airports** in the future, instead of the usual star shapes. Where severe crosswinds are frequent, add a shorter cross runway. Present airports should develop the dominant runway more fully, at expense of other runways if necessary.
- **Congress speed navigation aid** installations and research by granting CAA more funds for this purpose, especially radar traffic control.
- Cut ground noise from engine runups on airports—through cooperation of airports and airlines.
- Airlines train pilots to cut noise nuisance to minimum in flying around airports.
- CAA arrange flight patterns near airports to avoid flight over crowded areas.
- Airlines make training flights in open areas wherever possible.
- **Defense Dept. move military air** bases from civil airports wherever possible.
- Airlines buy flight simulators to train pilots in emergency procedures. Cooperative buying and use is suggested, because of high expense.
- **Push helicopter development** by civil and military cooperation.

► **Simulators**—Emergencies often occur close to the ground—on takeoffs and landings around cities. Pilot reaction should be instinctive. Yet you can't book train pilots to such a level of reflex emergency action, and you can't duplicate most these emergencies in flight training. The answer is flight simulators—already a substantial budget item in military training programs.

The simulator is a working model of an aircraft cockpit. The instructor controls the instrument readings. Thus, he can put the pilot through emergency drills that would train him to act instinctively in emergencies.

► **The Airport**—To make airports safer for present and future transports you need to lengthen runways, clear land beyond them, point the runways away from residential developments and zone new construction under the runway approaches.

More radar is another must on the Doolittle program.

► **Preferential Runways**—Before these improvements go through, the commission says airlines can step up use of runways pointing away from built-up areas.

Crosswind of 15 mph., now approved by CAA, probably can be safely increased for most planes, Doolittle says.

A speedup in development and use of castering landing gear to minimize crosswind conditions is asked. Use of preferential runways and construction of new single-direction airports should further spur crosswind landing gear development, the commission says.

► **Airport Construction**—Congress is urged to step up lagging federal aid for airport construction and improvement. The Federal Airport Act of 1946 called for the federal government to match local funds dollar for dollar. But Congress hasn't come through.

Doolittle says Congress either should match local funds now or else abandon the plan altogether, so the cities will stop waiting for federal aid.

The federal government spent $705 million in civil airport aid up to the end of the war. But despite the $100-million-a-year for 10 years authorized in the 1946 Act, Congress so far has appropriated only $169 million in the last seven years.

Right now, the commission notes, local governments have $75 million waiting to be matched by federal funds, but the prospective appropriation for the coming fiscal year is only $15 million.

► **One Runway**—The commission echoes the recent trend for building only one or two long, parallel runways. Existing airports should concentrate on lengthening and widening, improving their dominant runway. The trend of military aircraft to heavy jet planes already has forced this policy, the commission notes.

► **Zoning Problems**—The federal government has the power to prevent building obstruction to airport traffic, the commission believes.

But there is a big legal question whether the federal government could zone an approach to prevent it from growing into a residential area. That's been left up to the states and cities. But, says the commission, "the Supreme Court has gone to such extremes in validating congressional legislation to regulate commerce that . . . zoning power of this nature might be upheld."

If Congress should pass such a "Federal Zoning Act," the Act must give property owners a chance to claim that the zoning restrictions take away property value, entitling them to compensation.

To control airport safety, Congress could also give CAA and CAB power to close unsafe airports, the commission says. This could be done by granting or revoking "certificates" for each airport.

► **Traffic Lanes and Rules**—The commission says CAA should forbid local flying over metropolitan areas. In heavy traffic areas, there should be full radar control of traffic—even on a clear day.

In open areas, uncontrolled flying

should be restricted to fair weather.

Airports should have both ILS and precision approach radar and pilots should be forced to use both.

CAA should move 'holding patterns' and en route airways away from airport traffic.

All this would help stop in flight collisions, the commission says, citing the record of 160 air collisions involving civilian planes since 1946.

Pilot selection is okay now, and periodic physical checkups have been adequate to date. But from now on, airlines should tighten up physical checks on aging pilots, the commission says.

► **Noise Nuisance**—The foregoing recommendations would help cut noise nuisance to residents. It is all the more important to start work on that now, the commission says, because jet transports will make more noise and there is no way to muffle it in flight.

Ground muffling of jets taxiing and warming up at airports "will be expensive," the commission notes.

And the noise of supersonic propellers of turboprop engines will be so "objectionable ... it may be necessary to limit the use of such props near thickly settled areas."

► **Summing Up**—The commission says aviation can be the safest transportation in the world. The trouble is, fantastic growth in traffic volume and speed and aircraft size have made airport facilities obsolete and city planning difficult.

But the aviation record to date has been good, Doolittle notes. Fewer persons are killed by airplanes than by any other vehicle. "Even bicycles kill more innocent bystanders annually than airplanes."

The commission also recommends more CAA inspectors be hired to check up on airline maintenance and operations.

How Much U. S. Comet Interest?

One American carrier has expressed definite interest; some Britons fear politics may block certification.

(McGraw-Hill World News)

London—Will the Yanks buy the Comet? Since British Overseas Airways Corp. inaugurated the first civil jet passenger transport service early in May, all England has been popping this question.

While there is no immediate sale in sight, AVIATION WEEK can disclose serious interest in the Comet on the part of at least one major U. S. airline.

Meanwhile, BOAC started trial flights last week preparatory to establishing of regular London-Singapore Comet service in three months. By the end of this year or early in 1953, when all nine Series I Comets BOAC has on order are delivered, New York-Bermuda-Nassau service will be established. Late next year BOAC's 14 Series II Comets, which the airline hopes to use in trans-Atlantic service, should be ready.

► **Big Questions**—Regular Comet service has raised anew questions about what this threat to U. S. civil aviation supremacy means. Will commercial jets pay? Will the U. S. catch up before British production captures the available market? Will CAA certify the Comet for U. S. operators? Is government money necessary for civil jet development?

Probably not even BOAC could prove that jet transports pay, on the basis of operations up to now. And BOAC is holding on to available statistics as if they were A-bomb secrets. There are plenty of people on both sides of the Atlantic wondering how 36-passenger transports carrying 6,000 gal. of fuel and chewing it up at the rate of about 950 gal. per hr. can pay its way.

But the fact remains that BOAC already has ordered 23 Comets and shows every sign of increasing the number in the near future. Not even a nationalized airline can afford to commit itself so heavily on a venture that doesn't promise to pay its way.

► **Newer Comets**—And future Comets—Series II and probably Series III—promise to correct major drawbacks of the present model.

De Havilland gives first priority to increased range, second to increased capacity. The Avon Comet, now flight testing, should double the Series I stage length of 1,500 mi. The Series III Comet—still the designers' dream—may increase capacity to 60 or more.

Will British production be able to capture a good market before U. S. competition is ready? Comfortable assertion that it will not is being shaken by indications of a speedup in production here. Facilities at Hatfield are quietly being expanded to up present rate of better than one Comet a month now to better than two a month next year. In 1954, Short Bros. should turn out the first Series II Comet at Belfast—deliver components to Hatfield before that.

► **Comet Priority**—A production rate of four Comets a month by 1955 is not at all impossible. This could embarrass U. S. production plans geared to 1958. The British government is giving the Comet good priority, despite rearmament, since Comet exports are highly desirable in the boosting of British finances.

For years, CAA and the British Air Registration Board wrangled fruitlessly over performance standards of both piston and jet transports. Both authorities were going at it again at the IATA meeting in Copenhagen last week. So far, the U. S. agreed to accept British certification of piston aircraft and jet engines alone. But not so jet transports.

► **U. S. Position**—Latest U. S. official position was outlined in a hitherto unpublished memorandum from the Secretary of State to the British ambassador in Washington Feb. 27. It said the U. S. "general standards can probably not be definitely established without being based on one or more turbine-powered transports of domestic design. Nevertheless lack of general agreement should not mean that no basis exists on which specific individual type designs of turbine-powered aircraft produced in the United Kingdom may become eligible for certification in the U. S."

The memorandum goes on to say:

CAA must make "such rulings as are compatible with the general level of safety contemplated by its domestic regulations"—which CAA has failed to do despite persistent British pressure, backed by voluminous documentation on Comet safety setup.

The memorandum insists on examination by U. S. technicians of at least one type under actual operation and flight testing conditions. This is the real reason why the British concede sales must precede certification.

► **Retaliation**—The British believe certification of BOAC's proposed New York-Bermuda-Nassau Comet service is automatic under existing British-American air agreements. Attempts by CAA to block this probably would lead to retaliation against U. S. airlines using British facilities.

Is special government money necessary to develop civil jets? Widespread belief that large sums of government money built the Comet are not strictly true. Here are the facts:

• **Ministry of Supply** spent a total of £1.5 million toward the purchase of two Series I production models, one Series II, some special equipment and testing. De Havilland claims that didn't nearly cover cost of the aircraft involved.

• **Ghost and Avon engines** like power plants of all major civil airliners, are direct military developments.

• **De Havilland's** real support came shortly after design was worked out in 1945 when BOAC guaranteed to buy up to 10 Comets at a fixed price. Today DH has 45 firm orders, six tentative. The company figures to break even at 50 orders at roughly £500,000 each.

A company spokesman said: "If we didn't make a go of this thing we'd be out of business now."—N. McK.

BOEING YB-52 IN ITS ELEMENT

A new flight view of the eight-jet Boeing YB-52 Stratofortress recently released by the USAF shows plane with eight-wheel landing gear retracted, points up its clean lines. Powered by P&W J57 jets rated at approximately 10,000 lb. thrust each, the YB-52 spans 185 ft. and is 153 ft. long. It is now undergoing preliminary flight testing program at the Boeing plant in Seattle, where a sister XB-52 is being readied for its tests. Some fuselage skin wrinkling is evident under the trailing edge of the sharply swept wing in photo. The B-52 was ordered into production before rollout of first plane.

Glenn Martin Out As Board Chairman

Glenn L. Martin, founder of the airplane company bearing his name, has stepped down as chairman of the board in another move in reorganization of the company management. However, he continues as a major stockholder and member of the board, holding the title of honorary board chairman.

The Martin board of directors voted to name George M. Bunker as chairman, in addition to his post as president of the company. Other company officers elected: vice presidents Jess W. Sweetser, J. B. Wharton, Jr., William B. Bergen, C. C. Pearson and G. T. Willey; controller, Earl Uhlig; treasurer William L. Lucas, and secretary, Frederick S. Cross.

Convertiplane

- **Brighter future seen for rotary-fixed-wing craft.**
- **At least 17 firms study preliminary designs.**

By Alexander McSurely

Prospects are getting brighter for the convertiplane.

An AVIATION WEEK survey of most rotary wing aircraft manufacturers attending the recent American Helicopter Society forum in Washington discloses that a large majority of the top engineers polled agree with the recognized engineering authority, Dr. Kurt H. Hohenemser, of McDonnell Aircraft Corp.: "Problems are likely to be solved by a methodical engineering approach and the compound aircraft appears sufficiently attractive to warrant this effort."

In a paper presented before the society, Dr. Hohenemser forecast a bright future for the compound rotary fixed wing aircraft or convertiplane in the larger 20,000-lb.-and-over weight class, with advantages over the pure helicopter diminishing with decrease in size of the new craft.

► **What It Means**—Significance of the much greater industry acceptance of the compound aircraft is increased this year by the keen interest of all three military services. Their interest is rapidly pushing research and development in this field.

The Hohenemser paper was obviously based in part on McDonnell's program. McDonnell was one of three design competition winners (AVIATION WEEK Apr. 30, 1951, p. 14) in the 1951 USAF convertible aircraft competition (along with Bell and Sikorsky).

► **14 Others**—It is known that 14 other U. S. manufacturers have made at least preliminary studies on convertiplane designs, and that at least one postwar U. S. craft considered in this category, the Heldyne of Gyrodyne Co. of America, has been successfully flown. Before that, there was the prewar Herrick convertiplane, which still has adherents who are now planning a modern version with jet rotors.

Hohenemser indicated that the McDonnell entry in the USAF competition was based on previous studies for the Navy for a compound aircraft. It would have a high wing loading and a small rotor disk loading when operating with propeller in cruising condition, but would use a high rotor disk loading and ramjets in the rotor tips, like the McDonnell Little Henry H-20 helicopter, for vertical takeoffs and landings.

► **British Compound**—A parallel development in England, also cited at the AHS forum, is a twin-engine compound aircraft under development by Fairey Aircraft. It is designed for propeller operation for forward speed and jet rotor for takeoff and landing.

► **Tilting Rotor**—The Bell design in the USAF competition is for a fixed wing aircraft with rotor propellers which act as helicopter rotors for takeoff and then tilt forward 90 deg. to give propeller thrust. Many designers consider this the most difficult approach to the convertiplane problem yet one which will pay the largest dividends.

The third convertiplane configuration, represented by the Sikorsky design, calls for a fixed wing aircraft with jet power for forward propulsion and with a rotor for helicopter landings and takeoffs. The rotor is designed to be braked to a stop and retracted when the aircraft levels out for cruising.

► **No Man's Land**—In between the little helicopters and the big convertiplanes, Dr. Hohenemser sees a no man's land where both types of rotary wing craft will be competitive.

How this competition comes out depends on such things as:

Efforts to increase present speed limitations of helicopters by boundary layer control, high subsonic or even supersonic rotor tip speeds, variable gear ratios, partial unloading of the rotor in forward flight by a small fixed wing, reduction of parasite drag of the fuselage and landing gear by cleaning up design details.

The McDonnell scientist presented data to show that the addition of a fixed wing in the compound aircraft did not necessarily mean serious penalty in additional drag. Rather, he states, since the fixed wing of a compound aircraft can be designed for best lift/drag ratio in cruising attitude without

AHS Officers

Thomas R. Pierpoint, of Piasecki Helicopter Corp., has been elected president of American Helicopter Society, succeeding Bartram Kelley of Bell Aircraft Corp.

Six regional vice presidents: Miller Wachs, Sikorsky, New England; Charles W. Lefever, Prewitt, Mid-Atlantic; Ray Young, Navy BuAer, Southeast; Charles R. Wood, McDonnell, Midwest; John Beadling, Bell, Southwest; and Robert Wagner, McCulloch Motors, West. Re-elected: Monroe Reyner Brown, Piasecki, treasurer; and Jean Ross Howard, Aircraft Industries Assn., secretary.

compromise in design for the sake of landing and takeoff, the compound aircraft may even cruise at a higher combined lift/drag ratio than an equivalent airplane.

Other newsworthy discussions at the forum included:

• Prof. Kenneth Razak, University of Wichita, discussed boundary layer control applications for helicopters, including use of slot suction to reduce drag on the advancing rotor blade, and use of porous or slot suction to extend the lift curve on the retreating blade. Other potential uses include control formation of shock waves on advancing rotor tips at high speed and to prevent tip stall of retreating blade.

• Joseph Stuart, Bell Aircraft, discussed comparative merits of power systems, concluded that while pulse jets give best results for duration of 1 hr. or less, mechanical drive gas turbines are best for 1-6 hr. duration operations. Stuart apparently brushed off the piston engine as a future helicopter powerplant, presumably as soon as turbines of required sizes and reliability become available.

• Capt. Wayne Eggert, Wright Air Development Center, summarized his ideas on future research and development programs for helicopters, including such projects as improving throttle and pitch synchronization by mechanical linkage or remote control, increased reserve power, more stability, standardization of cockpits and instruments, airspeed system measuring down to zero, self-centering device on cyclic control to give the pilot a neutral position for reference, putting a "feel" into the cyclic control when boost is used, more attention to blade stall tests.

Breguet Receives Helicopter Award

Louis Breguet, French helicopter pioneer still active in rotary-wing development, recently was named winner of the Dr. Alexander Klemin trophy of the American Helicopter Society.

Breguet is credited with building a helicopter in 1907, with which he made short flights. In 1935 he demonstrated the first closed course flight of a rotary-wing aircraft.

U. S. Army Field Forces was named recipient of the Capt. W. J. Kossler award for development of techniques, equipment and organization which made possible the outstanding record of medical evacuation by helicopter in Korea last year. Army copters evacuated 4,832 Korean front line casualties in 1951. Col. Jack Marinelli of AFF headquarters, who had a large part in advancing the Army's helicopter development program, accepted the award for his organization.

►**Fellowship Awards**—The awards and two honorary fellowships in the American Helicopter Society were presented at the honors night dinner of the society last week in Washington. The fellowships went to Lawrence D. Bell, president of Bell Aircraft Corp., and Bernard L. Whelan, general manager of Sikorsky division, United Aircraft Corp., for their management and leadership in advancing the helicopter.

The Klemin trophy and Kosalet award were offered for the second time. Last year's winners respectively were Igor Sikorsky, copter pioneer, and Col. R. T. Kight, head of the MATS Air Rescue Service.

AF Facilities

- **$1.5 billion earmarked for 1953 improvements.**
- **Continental projects to get biggest share of fund.**

Biggest slice of the $2 billion military public works program planned for fiscal 1953, which starts July 1, is $1.5 billion for Air Force facilities.

Of this, $859 million is for continental works, $139 million for overseas works and $517 million for classified projects.

In addition to the $859 million for USAF continental works, the program includes $174 million for continental Naval and Marine Aviation projects. Major expansions:

Hammonton, N. J., AFB, $73.5 million; Patrick, Fla., AFB $40.7 million; Plattsburg, N. Y., Municipal Airport, $36.3 million; Tye Field, Tex., AFB, $32.3 million; Homestead-Dade, Fla., Airport (USAF), $31.5 million; Little Rock, Ark., AFB, $31.2 million; Sioux City, Ia., Municipal Airport, $29 million; Bunker Hill, Ind., NAS, $24.8 million; Westover, Mass., AFB, $24.3 million; Limestone, Me., Al-B, $23.9 million; Selman Field, La., AFB, $23.7 million.

Other continental projects:

• **Alabama.** Craig AFB $2.4 million; Birmingham Modification Center, $1.8 million; Brookley AFB $4.5 million; Gunter AFB $1.9 million; Maxwell AFB $12.1 million.

• **Arizona.** Davis-Monthan AFB, $5.3 million; Yuma County airport, $2.2 million; Luke AFB, $5.1 million; Williams AFB $1.7 million.

• **Arkansas.** Blytheville Municipal Airport, $1.2 million.

• **California.** Castle AFB, $1 million; March AFB, $3.6 million; Hamilton AFB $988,000; Oxnard AFB, $782,000; Palmdale Los Angeles County Airport, $380,000; Mather AFB, $8.4 million; Norton AFB $4.8 million; Long Beach Municipal Airport $112,000.

Naval Ordnance Test Station $1.9 million; Point Loma Fleet Air Defense Training Center, $3.3 million; Naval Air Missile Training Center, Point Mugu, $3.7 million.

• **Delaware.** New Castle County Airport (USAF), $2.3 million.

• **Florida.** Lakeland Airport, $10.1 million; MacDill AFB, $3.6 million; Venice Municipal Airport, $2.6 million; Pinecastle AFB, $11 million; Tyndall AFB, $1.6 million; Palm Beach County International Airport, $1.2 million; Eglin AFB, $2.3 million.

Marine Corps AS, Miami, $3.7 million.

• **Georgia.** Hunter AFB, $3.1 million; Moody AFB $2.1 million; Dobbins AFB, $1 million.

• **Idaho.** Mountain Home AFB, $16.6 million.

• **Illinois.** O'Hare International Airport (USAF), $4.1 million; Scott AFB, $1.7 million.

• **Kansas.** Forbes AFB, $10.7 million; Smoky Hill AFB, $6.1 million; Wichita AFB, $8.18 million.

• **Kentucky.** Godman AFB, $1.1 million.

• **Louisiana.** Barksdale AFB $3.3 million; Lake Charles AFB, $12 million; Houma USAF Gunnery Range, $3.2 million; Alexandria Municipal Airport, $4.3 million.

• **Maine.** Dow AFB, $8.2 million; Presque Isle AFB $881,000.

• **Maryland.** Air Research and Development Command, $1.6 million; Naval Air Test Center, $4.7 million.

• **Massachusetts.** Otis AFB, $2.8 million; Bedford Research Center, $10.3 million.

• **Michigan.** Kinross AFB, $872,000; Oscoda AFB, $668,350; Selfridge AFB, $1.8 million.

• **Minnesota.** Duluth Municipal Airport $843,000; Minneapolis International Airport $480,000.

• **Nebraska.** Lincoln Airport (USAF), $6 million; Offutt AFB, $821,000.

• **Nevada.** Stead AFB $6.2 million; Nellis AFB, $5.3 million.

• **New Mexico.** Walker AFB $3.2 million; Clovis AFB, $1.3 million; Holloman AFB, $1.4 million; Kirtland AFB $10.2 million.

• **New York.** Niagara Falls Municipal Airport, $2 million; Stewart AFB $3.5 million; Suffolk County AFB $2.6 million; Griffiss AFB $1.8 million.

• **North Carolina.** Raleigh-Durham Municipal Airport (USAF), $13.3 million; Seymour-Johnston Field, $9.7 million; Raleigh-Durham Municipal Airport, $18.9 million.

Weeksville NAS, $237,000.

• **Ohio.** Lockbourne AFB, $13.6 million; Lockland Plant $2.3 million.

• **Oklahoma.** Clinton NAS $13.6 million (USAF project); Ardmore Municipal Airport (USAF) $4.6 million; Vance AFB $7.6 million; Tinker AFB $2.3 million.

• **Oregon.** Portland International Airport (USAF), $973,000.

• **Pennsylvania.** Greater Pittsburgh Airport (USAF) $1.3 million.

• **South Carolina.** Myrtle Beach Airport (USAF) $3.3 million.

• **South Dakota.** Rapid City AFB $3.1 million.

• **Tennessee.** McGhee-Tyson Airport, $1.3 million; Arnold Engineering Development Center $12 million.

• **Texas.** Biggs AFB $733,000; Caravell AFB $13.6 million; Galveston Municipal Airport $6.2 million; Big Spring AFB $6.8 million; Bryan AFB $3.8 million; Hampton AFB $4.8 million; Foster Field $9.1 million; Goodfellow AFB $3.7 million; Harlingen Municipal Airport, $11.3 million; James Connally AFB, $7.8 million; Laredo Municipal Airport, $4.3 million; Langhlin AFB $4.8 million; Moore Field, $12.8 million; Perrin AFB, $4 million; Randolph AFB $5.7 million; Reese AFB $8 million; Kelly AFB, $6.3 million; Brooks AFB, $6 million.

• **Utah.** Hill AFB $1.7 million.

• **Vermont.** Burlington Airport (USAF), $624,000.

• **Washington.** Fairchild AFB $9.3 million; Geiger Field, $744,000; Larson AFB $12.8 million; McChord AFB $8.7 million; Paine Field $1.8 million.

• **Wisconsin.** Truax AF Field, $1.5 million.

A Defense Appeal: Scrap for Steel

German Airline May Start in Year

Big problem for new Lufthansa will be finding planes and pilots; wide use of copters planned.

By William Kroger

Frankfurt—A German airline will be operating in possibly less than a year.

Signing of "contractual agreements," expected this week or next, will set in motion and is expected to bring into the open amazingly detailed plans for air service, carefully laid by American and German officials.

Some of those plans were outlined here by German officials in an exclusive interview with AVIATION WEEK. Asked about a starting date for the airline, Dr. Kurt Knipfer, director of the Civil Aviation Division of the Ministry of Transport, German Federal Republic, replied that the Transport Minister had expressed hope planes could be in the air by the spring of 1953. Ratification of the contractual agreements by the American and German governments, by no means certain, will not be fast. So the spring, 1953, date implies that plans are not waiting on the agreement. The present thinking of German officials is along these lines:

- **Wide use of helicopters** internally.
- **Step-by-step progress** from a European line to far-flung international operation.
- **A joint government-private** corporation, with the government owning the majority of stock.
- **Initial use of foreign** planes, probably U. S.-built.
- **A name** other than Deutsche Luftlansa, which was the prewar German airline.

Admittedly, obtaining the planes is the toughest obstacle. Dr. Knipfer said that informal negotiations are in progress with unidentified outside sources.

▶**May Use 2-0-2s**—Three ways to surmount this obstacle to meet the spring, 1953, deadline seem apparent: a contract with a foreign line to operate German air service until the Germans are able to do it themselves (probably never acceptable); lease planes; buy used planes. Most likely is a combination of the last two, with U. S. officials lending aid in finding available planes.

If what U. S. officials have done so far to reestablish German civil aviation is any guide, the new German airline will have no trouble in rounding up enough planes to start. One high U. S. official mentioned the fact that Martin 2-0-2s seem available in the United States.

The training of pilots is also a major job, but some progress already has been made. Swissair some months ago hired a group of former Lufthansa pilots. German officials are quick to point out that this was a private deal between Swissair and the pilots, and the government played no part in it. Whether it was or not, it seems certain that these pilots will flock back to their own national line at the earliest opportunity.

▶**Pilot Standards Set**—Officially, all that has been done about pilots is the establishment by Dr. Knipfer of a small group to lay down pilot standards. Of course, Germany is full of former Lufthansa and Luftwaffe pilots, but most of them are too old or out of practice. But since its legalization a year ago, gliding is once again the top sport in Germany and several hundred pilots have been trained.

In other requisites for an airline—mechanics, airport operators and tower personnel—Germany is in astonishingly good shape.

The USAF is using German auto technicians as ground crewmen—and auto firms are one of the busiest German industries. One U. S. official says he used to hold an A&E mechanics license and there is little difference working with automobile or plane engines.

Rebuilding of German civil aviation started with air traffic control and airports for the very good reason that the occupation powers needed them for their own use. Under the Allied High Commission for Germany is the Civil Aviation Board, composed of U. S., British and French representatives.

▶**Train Controllers**—This group is working with German Civil Aviation division in training traffic controllers and airport operators (as well as advising on the establishment of the airline). Most towers now are staffed with Germans and by early next year the board hopes to turn all towers and airways control over to the Germans, according to Thomas D. Johnson, U. S. member of the board.

There is no lack of interest by the Germans in the work. When the Civil Aviation division sent out a call for tower personnel, about 6,000 former Luftwaffe and Lufthansa pilots responded. (The Germans asked for a Link trainer to help train their men, but one nation represented on the Civil Aviation Board objected because the Germans are not supposed to fly powered aircraft under terms of the occupation statute.)

In addition to trained tower and airways personnel, Germany now has a complete installation of visual omni-

range covering the entire Federal republic—probably the only nation in the world blanketed by omni. The system was dedicated at Rhein Main airport here week before last in the presence of leading CAA officials, including A. S. Koch, Administrator of International Region.

▶**Deep Interest**—The dedication coincided with the third annual meeting since the war of the German Industry Association of Airports. Both attendance at the annual dinner (200-300) and subjects of the papers delivered (jet transports and traffic control, for example) indicated the depth of interest and progress the Germans have made in re-establishment of civil aviation.

The association is only a shadow of its prewar size. Then it had 60 airport members, against 10 today. But interest and planning were enthusiastic, according to Dr. Ing. Werner Treibel, executive director. Dr. Treibel, prewar assistant to the chief engineer of Lufthansa, is now director of Stuttgard Airport and one of the strongest boosters for helicopter internal services.

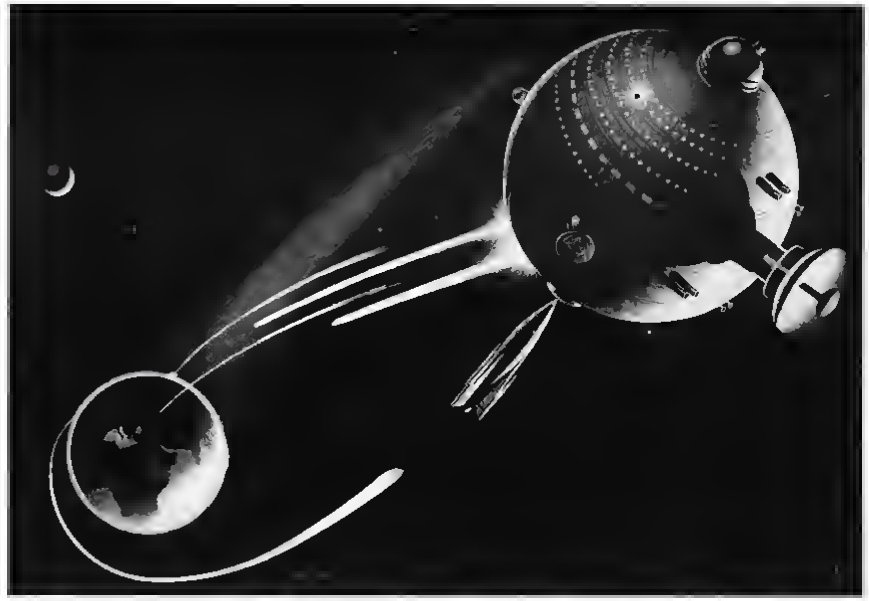
While the association is roughly comparable to the Airport Operators Council, its influence extends into many spheres, and about a year ago it set up a committee to study helicopters. Dr. Treibel says this committee feels a twin-engine copter is needed but none yet designed will do the job, including the Piasecki H-21 and the Bristol 173, both of which are familiar to him. One is too big, he said, the other too small.

▶**German Copter?**—Asked whether any firm in Germany could build the desired copter, Dr. Treibel said with German pride, "Professor Focke (of Focke Wulf) could do it but the decision is not up to us." Focke, Dr. Treibel reminded his interviewer, was a pioneer in helicopter work.

In many circles one finds confidence that Germany can supply the other missing element to the airline—planes—as soon as it is permitted to do so. Dr. Knipfer said nothing in the contractual agreement will forbid the German manufacture of planes, but defense work may interfere with plans for transport building. And a hardboiled U.S. official, with a realism probably unpalatable to Germany's next door neighbors, said, "We ask them to supply troops with guns; do you think we can stop them from building planes?"

Canada Defense Budget

Royal Canadian Air Force is getting close to half of Canada's fiscal 1952-1953 defense budget of $2.1 billion. The planned expenditures are up from the previous fiscal year's $1,609,314,371 and include about $300 million as Canada's NATO contribution and $98.2 million for the Defense Production Dept. and associated agencies.



SATELLITE BASE, shown here in artist's conception, copyright 1949, Mechanix Illustrated, Fawcett Publications is one suggested design for manned earth satellite vehicle The author believes that although final designs of such space stations may be different from current concepts, such studies based on today's limited data establish terms of reference and stimulate critical thought

How Far Are We From Space Flight?

We already have lots of the answers we need for space travel, and hard thinking is being done for the rest.

By Frederick C. Durant

Rising public interest in space travel artificial space stations and astronautics in general is causing many persons in the conventional aviation field to examine these subjects more closely—to sort out fact from fantasy

► **Dream or Reality?**—Is the public being taken for a Sunday supplement ride' or is this age old dream close to reality? The purpose of this article is to examine briefly and factually the achievements during the past few years which relate to space flight, and some of the many problems yet to be solved

The current growing interest is being fed by nearly every public medium of communication TV and radio programs, science and fantasy fiction, advertisements, newspapers, comic strips, magazines, and motion pictures have made space travel a common phrase

The Mar 22 issue of Collier's Magazine, featuring a series of articles on the subject sold nearly 4,500 000 copies Even the conservative Christian Science Monitor recently ran a series of 15 articles entitled "Flight Into Space."

Before a recent meeting of the American Rocket Society in Washington, D C, at which Dr Wernher von Braun formerly of the German guided missile establishment at Peenemunde, and now technical director of Army Ordnance's Redstone Arsenal spoke, roads to the Naval Ordnance Laboratory were jammed for miles Thousands of would be listeners were turned away for lack of accommodations

► **Sophisticated Interest**—Just how does current interest in space travel differ from previous enthusiasm, such as that of the Twenties? The main difference is the level of knowledge of all scientific subjects related to rocket powered flight These subjects run the gamut of theoretical and applied physics, astronomy, propellant chemistry, metallurgy, combustion kinetics thermodynamics, electronics, aerodynamics fluid mechanics, analytical mechanics, meteorology and space medicine In addition to these, dozens of related technical fields such as structural and mechanical design, turbopumps, air conditioning servo mechanisms, electronic computers, telemetering and astro-navigation have advanced greatly

Dr Paul F Winternitz, director of research, Reaction Motors, Inc., re

FREDERICK C. DURANT (right talking with Dr Hermann Oberth, pioneer proponent of rocket power) is vice president of the American Rocket Society and was its delegate on technical matters to the Second International Astronautical Congress held in London in September, 1951. From 1948 to 1951 he was engineering officer for the U. S. Naval Air Rocket Test Station, Dover, N. J., with the rank of lieutenant commander. Recently he returned to inactive duty. Mr. Durant's earlier experience included 5½ years as a Naval aviator in research and development assignments. He was an engineer with the Bell Aircraft Corp. rocket group in 1947 and 1948 and an engineering employe of E. I. du Pont de Nemours Co. from 1939 to 1941.

cently stated that creditable liquid propellant rocket engines could have been built 50 years ago. By this is meant that technological materials and theory were available to be applied.

▶ **The Pioneers**—There were individual workers, but their efforts were isolated. The remarkable research and experimental work of Dr. Robert H. Goddard, together with induced and independent research abroad, resulted in practical demonstrations of controlled rocket power, contributions to rocket theory and experimental verifying data. This period was roughly from 1915 to 1930.

Men such as Oberth of Rumania, Tsiolkowsky of Russia, Sanger of Austria, and Esnault-Pelterie of France, and many others were, like Goddard, serious workers, dedicated to research. But their efforts were personally directed, never part of a national industrial effort.

▶ **Germany's V-2**—It was the Germans who were first to engineer rocket power. With the financial backing of the military and spurred by the requirements for weapons they designed and mass produced the V-2. This weapon was a real achievement representing the integrated solution of dozens of new and complex problems. The result was the birth of a new weapons system.

Since World War II, every major nation in the world has continued exploitation of rocket power. The U. S. in particular has continued to achieve important engineering feats that are in themselves milestones along the road to interplanetary flight.

▶ **U. S. Missiles**—One of these achievements was the Army Bumper WAC program in which the WAC Corporal missile was fitted as a second stage to a modified V-2. At maximum speed of the V-2 the WAC Corporal was fired, resulting in a new speed and altitude record. A minimum of three or four stages would be required to achieve the necessary speed (over 20,000 mph.) for earth satellite flight above the earth's atmosphere.

Another milestone was the Navy Viking missile which set a new altitude record for single-stage missiles.

An equivalent accomplishment has generally passed unnoticed in the breaking of all altitude and speed records for manned aircraft flight by the Bell X-1 and later the Douglas Skyrocket. This achievement is the design and construction of a rocket powerplant so safe and reliable that its use is permitted in manned aircraft. This was done by Reaction Motors under U. S. Navy contracts.

▶ **Research Contracts**—Currently, hundreds of research and development contracts relating to guided missiles have been let by the armed services to industrial firms, universities and private and government laboratories. Some of these contracts are tasks of a basic nature—such investigations as performance of extreme energy propellants

(e.g., hydrogen and fluorine) in small rocket engines, measurements of rates of heat transfer in alloys submitted to extreme temperatures, and development of theories of the manner in which molecules of propellants react under conditions of rocket chamber combustion.

These studies are necessary because conventional rocket motors pose problems unique in the field of combustion powerplants. For example:

- **Combustion chamber temperatures** are in the neighborhood of 5000F.
- **Combustion exhaust velocities** of over a mile a second are reached.
- **Propellants,** by their nature, contain enormous stored energy and may be unstable and corrosive, resulting in special handling and storage problems.

In constant efforts to attain increased performance, higher energy propellants, increased operating pressures and larger engines magnify these problems.

If nuclear energy were available for propulsion today, despite its vast power potential it too would pose great problems.

- **Extreme temperatures** developed in the fission process, far higher than in combustion.
- **Heavy shielding** required to protect equipment, instrumentation, and when live cargo is carried, the passengers.

Other government contracts relate to detailed engineering studies, design and construction of test vehicles, and firings to obtain data.

▶ **Outside Help**—A contract to produce a prototype missile or sounding rocket results in a large number of subcontracts. It calls for many items not normally available nor easily produced by the prime contractor. An example of these are the ceramic linings (special silicon carbide) produced for uncooled rocket motors.

There are hundreds of others: high-performance accumulators used for power sources in guided missiles, plastic propellant expulsion bags, pressure regulators, solenoid operated valves, igniter assemblies, telemetering equipment, static and flight testing instrumentation, storage tankage for propellants, trailers and trucks to haul and erect missiles, and turbopumps to transfer the propellants from missile tanks to combustion chamber.

All of these items must be designed to meet exacting weight and performance specifications and exhibit complete reliability.

▶ **How Soon?**—Now, what about space travel? Is the establishment of a manned space station traveling in a satellite orbit around the earth a simple extension of today's achievements in guided missiles and rocket power? The answer: It is an extension but a long one.

Sufficient progress made in allied fields indicates that a program to establish a manned earth satellite can today be conceived as a long range engineering project. The scope of such an undertaking would be huge and exceedingly complex. Furthermore, progress would be geared directly to data not yet recorded.

▶ **Task Breakdown**—The project can be envisioned by competent engineers and scientists as logically separating into a number of related tasks, each relatively large in itself. For instance, the problems of protection against meteorites, solar and cosmic radiation (reflection, absorption), zero gravity upon the human body and minimum weight design cannot be solved without pertinent data obtained only from outside the earth's atmosphere.

There have been many studies made of meteorite hazards, estimating numbers and sizes which a space vehicle may expect to encounter. It is believed that a thin "bumper" shield of dural or stainless steel surrounding the vehicle may serve as protection against all but relatively large meteorites. Attack upon the problems of cosmic radiation that will be encountered has been aided by recent nuclear physics research and data recorded by vertically fired sounding rockets. The actual magnitude of the

problem of radiation hazard to humans can be conjectured only at this date.

It is conceivable that cosmic radiation will present such a hazard to humans that manned space travel may be delayed for years while lightweight shielding or other techniques of absorption are developed.

The condition of "weightlessness" that humans will experience establishing a satellite craft is caused by balancing the earth's gravitational pull with centrifugal force of the orbiting space ship. No means have been found to duplicate this condition on earth. The first few seconds of free fall of a parachutist simulate the condition but what really requires study are the physiological and psychological effects of prolonged weightlessness. A start has been made on this problem by the Air Force School of Space Medicine. Specially conditioned Rhesus monkeys and rats have ridden sounding rockets to high altitudes. During the period from velocity reduction upwards to velocity increasing downwards in rarefied atmosphere, weightlessness is experienced by the animals and data have been recorded.

▶**Unmanned Satellites**—The key to obtaining the data on space problems lies in unmanned, telemetering, rocket-powered artificial satellites. The trajectory of these vehicles will be programmed to turn from a vertical ascent to a parabolic and later, a circular orbit around the earth. Design configuration will stem directly from long-range rocket powered guided missiles.

A great many of these unmanned test vehicles will be required, each improving upon its predecessor. Each will record data on propulsion characteristics, radiation, controls operations, suitability of materials and dozens of related parameters of time, temperature, pressure, velocity and acceleration. The first such vehicles may pass out of control. Later ones may burn up on reentry into the earth's atmosphere. But, eventually, man will succeed in sending reliable, data-obtaining missiles into space as earth satellites and effect their recovery.

Getting these vehicles through the earth's atmosphere poses no aerodynamic heating problem on the way out, but a serious one on the way in. To return to earth a satellite vehicle need only reduce its speed by the use of forward firing rockets. As gravity gains control of the craft it will be pulled earthward. On entering the earth's atmosphere, aerodynamic surfaces must be present to reduce flight speed to reasonable values or frictional heating will cause the vehicle to burn up.

▶**Next a Man**—From the data thus obtained design of manned artificial satel-

lites could proceed. No one can say whether the data obtained will make the difficulties insurmountable at today's level of scientific and technical knowledge. It may be expected that unforeseen problems will present themselves as well as new methods and techniques devised for the solution of others.

Certainly many setbacks can be anticipated. They have occurred in every engineering task of unusual nature. On the other hand, during the next decades many new scientific discoveries will be made which will ease the problems encountered with respect to today's level of knowledge.

Therefore, viewed as a long-range program it would be foolish to say that it will not be possible to achieve manned space flight in the Twentieth Century. Required are three ingredients: Continuing interest and enthusiasm, scientific and technical competence and financial backing.

The military and social advantages accruing from successful achievement of manned flight into space have not been discussed here. There is no doubt that the undertaking fires the imagination and attracts pioneer spirits. That competent engineers and professional scientists are being attracted to the subject in increasing numbers is indicative of the feasibility of at least investigating the problem more closely—of estimating costs of individual tasks in manpower, materiel and dollars—of relating these to military and social advantages that would result.

► **Military Foundation**—The military is providing at this time nearly all of the significant research and development which will hasten the day of space flight. This assistance is largely indirect. For example, about $1 billion is being requested in the fiscal 1953 military budget for guided missiles. Much of this money will be expended in mass production of military missiles.

"Notice that with Whizzair you get a champagne dinner and escalator type steps."

Aeroplane

and in development of others.

However, this money will also develop telemetering and computing equipment and special hardware. Basic studies will be conducted on nearly all problems associated with rocket power, ballistics trajectory, and high speed aerodynamics of missiles. Techniques of launching, propellants-handling, missile tracking and production methods will be developed and improved. Thousands of personnel—technicians, researchers, engineers and scientists—will enter the field. Thus the guided missile industry will increase materially the knowledge required for space flight.

It is assumed that the military services will not neglect the potentialities of space satellites for global defense. The professional societies are becoming increasingly mindful of their responsibility with regard to the inherent scientific possibilities and their relation to man. Thousands of brilliant students today in schools and universities are eager to make the achievement of space flight their life's work.

The answer to space flight lies in the future. The planning has commenced. But realization will come only with a specific program, organization and financial backing.

THRUST & DRAG

Lockheed Aircraft Corp. dedicated its new engineering building recently as a symbol of the importance of the engineer in this air age. Three million dollars worth of construction brings together under one roof over half the 3,300 engineers at Lockheed. There are four floors for the design staff, a basement which will "resist" atom bombing and a brain room which houses computers inside its concrete walls. The building itself is just short of 400 ft. long and has walls of corrugated steel panels only three inches thick on the building's long sides. End walls are concrete. There's shadow-proof lighting in wall-to-wall lines six feet apart. All windows, full length of each floor, are permanently sealed for reasons of air-conditioning design. Altogether it's a handsome place to work—and Lockheed is working on lots of new projects.

* * *

In case you didn't know, the only factor preventing airplanes from vertical takeoff is the development of an engine which can take operating temperatures of 3,000F. And do you know when we'll get those engines? When gas heat-treating equipment capable of higher temperatures is designed for use. At least that's what delegates to the American Gas Assn. annual conference were told recently. To these people and to all others who claim that their field alone holds the key to vertical takeoff of aircraft, this column gives the Induced Drag Coefficient Award of the week. If I had some spare photos of helicopters—which have been making vertical takeoffs for years without 3,000F. operating temperatures—I'd send them to members of the association. Such stories are one kind of gas the aviation industry can do without.

* * *

Interesting point of aerodynamic design difference between the big Boeing B-52 and Convair B-60 is in the control surfaces. Convair's approach is conventional, probably because the B-60 is a modified B-36 basic airframe.

But Boeing has gone all-out for narrow-chord surfaces. For instance, the rudder of the B-52 is only 10% of the vertical-tail chord, probably the lowest value in current practice. B-52 ailerons also are of narrow chord. And on the B-52 wing between the nacelles are a pair of short-span control surfaces which do something to the lateral motion of the craft, judging by their position in the few flight shots available of the big craft.

One other noteworthy point on the B-52 is that the root chord of the horizontal tail is almost the same size as the wing root chord. And an 8-deg.

range of adjustments is shown on the fuselage side for the horizontal stabilizer

* * *

Cornell Aeronautical Laboratory, Buffalo, N. Y. has announced the establishment of an industrial division devoted to the exploration of fields expected to be useful to industry. Headed by Edward R. Dye, a specialist in airplane crash safety, the division is putting great emphasis on safety studies, particularly in automobile design and athletics. The lab also says that its studies in electronics, heat transfer techniques, airflow, hydraulics, servomechanisms and materials should be of considerable interest to industrial clients.—DAA

Brooklyn Tunnel Goes Up to Mach 5

A Mach 5 windtunnel, designed primarily for industrial research, has been placed in operation recently at the Polytechnic Institute of Brooklyn.

The tunnel is a blowdown type with a 4-in. by 4-in. test section. Design responsibility was shared jointly by Dr. Paul A. Libby, associate professor of aeronautical engineering and Dr. Antonio Ferri, noted for his pioneering work in supersonic aircraft design research.

▶**Pressure Storage**—Operating air for the tunnel is stored in Navy-loaned torpedo air bottles at a pressure of 3,000 psi. and a volume of 100 cu. ft. Dr. Libby hopes to increase this storage capacity to 800 cu. ft. in the near future.

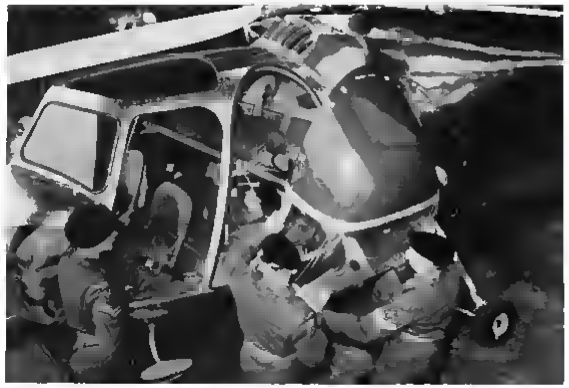
Right now it takes about 5 hr. to pump the tanks up to pressure from ambient conditions, a single 50-hp. gasoline-engine compressor does the job. Usually the storage tank pressure is blown down only to 1,500 psi. so that charging to 3,000 psi. is reduced to a matter of about two hours. If necessary, four complete test runs—each lasting about one minute—can be made in a standard working day.

Nozzles are available for Mach 2 and 3 right now, with the higher-number nozzles to be produced as need dictates.

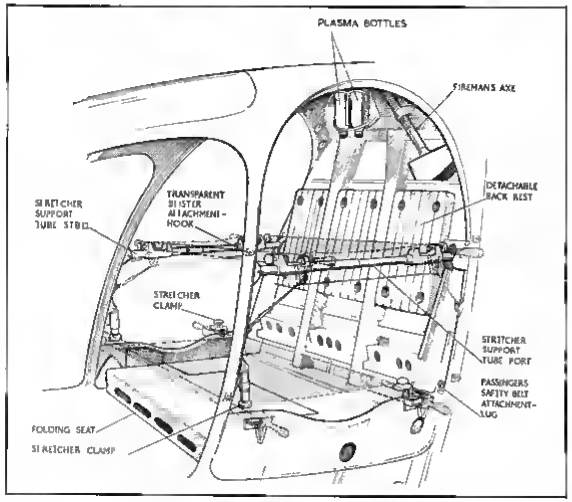
The tunnel also has schlieren and shadowgraph equipment. The schlieren unit was partially an undergraduate thesis and was completely built at Brooklyn Poly for a cost of only $1,500. Mirrors are 6 in. diameter.

A photopanel arrangement is used to read pressure gages and manometers for data collection. The panel is currently equipped with 11 gages and five manometers.

Get in the Scrap—Turn Yours in for Defense



SIDE BLISTERS are added to Sycamore 10 to convert for ambulance duties.



INTERIOR CUTAWAY shows specialized fittings for stretcher accommodations.

Bristol 171 Copter Gets New Jobs

Duties of Bristol's Type 171 single-rotor helicopter have been extended to include air ambulance work and general communications in a new version designated the Sycamore 10.

This British copter has been demonstrated to high officers of the Royal Air Force, and more recently did casualty evacuation work in the Army exercise "Surprise Packet." The latest reports from Bristol say that the Ministry of Supply is putting the craft through an intensive test schedule at Boscombe Down.

►**Redesigned**—There have been extensive modifications made to the Sycamore in order to accommodate two stretchers, placed one above the other across the cabin. Length of these stretchers required large blisters to be added to the fuselage sides to house head and foot ends. These blisters are of Perspex—a standard British transparent plastic for aircraft—and are detachable. Then can be replaced with ordinary faired units when the craft flies in a communications role.

The Type 171 usually employs sliding doors, but these would be inoperative when blisters are fitted. So instead, hinged doors are used and these are jettisonable.

The lower stretcher of the pair is supported by a metal structure which can be folded back to make a single seat for three passengers. Support for the upper stretcher is a pair of bars normally housed in a vertical position alongside the engine bulkhead, when needed, they are swung into position and pin-secured. Both stretchers are held down by clamps.

►**Ancillary Service**—The engine bulkhead also carries a housing for plasma bottles and a plug socket for electric blankets which are used in cases of exposure or shock.

The medical attendant sits beside the pilot in a swivel chair. To give the attendant freedom of movement, the back of the pilot's chair has been cut down.

For a communications job, the back seat and the attendant's chair give seats for four passengers.

Sycamore 10 is the latest development of the basic Type 171 airframe which first flew in July, 1947. Unusual design features of the craft are a high rotor speed and a high rotor moment of inertia. These features enable the storage of a certain amount of kinetic energy in the rotor system so that loss of rpm (in an engine out emergency landing) is minimized. And Bristol says that the high rotor speed also reduces undesirable vibration common to most copters.

The Mark 3 version is the current production copter; it uses the Alvis Leonides L E 23HMV engine of 550 hp. Main rotor diameter is 48 ft. 6 7 in. Gross weight is 5,200 lb.

Hovering ceiling of the Bristol 171 is 7,900 ft.; maximum vertical rate of climb is 930 fpm. And top speed at sea level is 133 mph.

Method Predicts Steel Qualities

A method for advance prediction of the hardening characteristics of steel compositions is being made available to industry by United States Steel Corp.

The method makes possible design of steels of required hardening qualities from the available supply of materials—particularly vital in a market of short supply.

Dr. Marcus A. Grossman, company advisor in research planning, in whose

name the method was patented last year and later assigned to the company, has been able to assign definite hardenability values to steel constituents by use of the system.

Grossman reports that in the past it was roughly known which alloying elements improved the hardenability of steels. Now, by multiplying the hardening factors, a closer approximation is obtained.

He puts it this way: "In one column we can set down the hardenability we need for a given job, as in defense production. In a parallel column we set down the quantities of alloying elements we have to work with. With this information and the new data we can then design steels of required hardenability from our available materials."

RAeS Announces Award Winners

G. H. Dowty, founder and now chairman and managing director of Dowty Equipment Limited, has been elected president of Britain's Royal Aeronautical Society for the year 1952/53, according to a society announcement. He is a vice president of the RAeS and an associate fellow of the Institute of the Aeronautical Sciences.

The RAeS has also announced prize awards made annually for the various contributions in aeronautics. This year's top winner is Dr. Theodore von Karman, who will receive the society's gold medal for his outstanding work in aerodynamic theory.

Other award winners:

- **Dr. Hubert Sutton,** Ministry of Supply, receives the society's silver medal for his "outstanding work over many years on metallurgy in aircraft design."
- **Harry Povey,** de Havilland's production manager, receives the society's bronze medal for his work on the production of the Comet.
- **George R. Edwards,** chief designer Weybridge Works, Vickers-Armstrongs, Ltd., receives the British gold medal for his "... outstanding work in aircraft design." Edwards has been responsible most recently for the Viscount turboprop transport and the Valiant four-jet bomber designs.
- **Dr. David M. Smith,** chief engineer of Metropolitan Vickers Electric Co.'s gas turbine dept., receives the British silver medal for his contributions to the development of British gas turbines.
- **James Martin,** chief designer and managing director of Martin-Baker Aircraft, receives the Wakefield gold medal for his work on ejector seats.
- **Walter Tye,** chief technical officer of the Air Registration Board, receives the George Taylor (of Australia) gold medal for his paper on "Modern Trends in Civil Airworthiness Requirements."
- **H. H. Gordner** receives the Sims gold medal for his paper on "Structural Problems in Advanced Aircraft."
- **Dr. J. Seddon, RAE,** receives the Herbert Ackroyd Stuart memorial prize for his paper on "Air Intakes for Gas Turbines."
- **Handel Davies,** senior principal scientific officer and head of aerodynamics flight section, RAE, Farnborough, receives the Edward Busk memorial prize for his paper on "Some Aspects of Flight Research."

PRODUCTION

Low-Cost Jet Blades for Future

Survey report details new forming methods, predicts 12 to 16-cent blades from cold-rolling process.

New methods of forming jet engine blades give promise of easing one of the most critical problems of aircraft engine production, according to a survey just completed for defense production officials in Washington, by a veteran power-plants expert.

Importance of these developments is pointed up with the fact that a single jet engine may use as many as 2,500 or more blades.

Probably most promising among the new processes is a cold-rolling process of forming jet engine blades, which may bring the cost down to as low as 12 to 16 cents a blade, approximately one-tenth of present blade cost.

▶ **Delco Process**—Still in early development stage at the Delco-Remy division of General Motors Corp., Anderson, Ind., the cold-rolled blade project is already being considered for manufacture of forged blades of the Allison T40 turboprop, Allison J35 and J71, the General Electric J47 and the Buick version of the J65 Sapphire turbojets.

Meanwhile, other manufacturers are pressing their experimental programs for other methods of making jet blades, with shell molding (or shell casting), powdered metal (or sintering), hot-rolling and precision forging processes all having their advocates.

▶ **Official Report**—Analysis of the U. S. aircraft turbine engine blade situation, sums up the new processes and their prospects:

- There is no immediate shortage of either turbine engine blades or facilities for manufacturing them, provided there is no attempt to manufacture all spares concurrently with scheduled production.
- Both the cold-rolled process as presented by Delco-Remy and the shell-molding process by Curtiss-Wright's Metal Processing division (Buffalo) offer good possibilities for mass production and reduction of costs provided development tests are satisfactory.
- Successful development of these methods will tend to lower costs and to lower requirements for expensive tooling needed for other processes of blade manufacture. Such tooling and equipment would then be available for other uses.
- Practical goal is to find a solution satisfactory in price, quantity and performance over the greatest number of blade stages in the greatest number of engines. This would leave a minimum of cases where special blades may have to be produced by more costly processes.

The official report included discussion of visits to Air Force engine contractors, including Allison, General Electric, Curtiss Wright, Delco Remy division, and Curtiss-Wright Metal Processing division. The surveyor did not visit Navy engine contractors, Pratt & Whitney and Westinghouse.

▶ **Allison Program**—At Indianapolis, Allison is getting about 80% of its blades from Thompson Products. Its experimental programs include precision forged blades and blades made by powdered metal or sintering process for use in the stator only, both from Thompson Products. Eaton Manufacturing Co. is producing some hot-rolled blades which are being run in the J35.

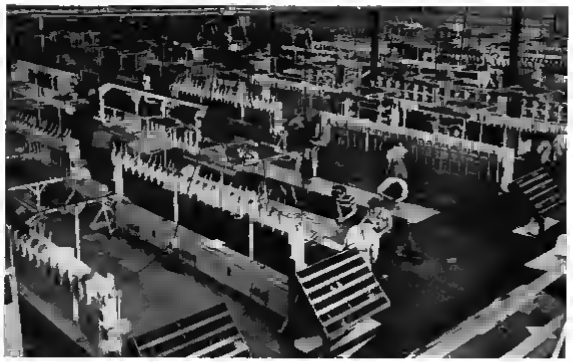
First Delco Remy cold-rolled blades are for the stator and the ten inner stages of a T40 compressor. Then longer blades are to be built for the compressor and stator until a complete set of blades for this engine are provided. By similar stages, it is planned to make blades next for the J35 and later for the J71. Delco has shown its ability to handle close tolerances and to handle various curves, tapers, twists, etc., required by various blade specifications by the cold-roll method. After 824 hr. test the Delco-Remy blades have been found "very satisfactory" in stages 10-19 on the T40 engine, Allison has reported.

▶ **GE Interested**—General Electric is furnishing Delco Remy with a drawing for one stage of blading for the J47. Delco Remy is to report on what it can do in making this blade cold-rolled. GE engineers are quoted as saying the cold-rolled process is "the best prospect" they have seen to date.

The third Delco-Remy blade prospect is for making blades for the J65 Sapphire engine for Buick-Oldsmobile. Curtiss-Wright, through its technical exchange of information with Buick on the J65, expects to keep advised of the progress made on this development, and has indicated that if it works out it may also move into the cold-rolled development.

▶ **Curtiss Blade Program**—Meanwhile, shell-cast blades are being tested for Sapphire stators, but at the time of the survey report rotor blades made by shell-casting had not yet been run on an engine. Preliminary vibrator rig tests indicated the new blades were as good or better than the British cast blades, previously used.

Cost of shell-cast stator blades was quoted at approximately $1.60, with finishing a major cost item. Curtiss-



CONTINENTAL CAN TAKES ON AIRCRAFT WORK

This Continental Can production line turning out Boeing B-47 wingflaps is part of recently acquired plant in Coffeyville, Kan., formerly operated by Dixon Mfg. Co. The move brings Continental Can into the aircraft field, and, the company's chairman, Lucius D. Clay, states it provides the engineering staff and production know how applicable to further aviation work. The plant is also engaged in turning out B-47 tank deck doors, landing gear doors, drop tank struts and bomb rack kits, in addition to B-29 and B-50 elevators. Also made are 20-ton hydraulic jacks for aircraft maintenance.

Wright engineers feel that cast metal has the best heat resistance for turbine blades and should prove better than forgings. While the first engines built by C-W will have forged blades, it is planned to switch to shell-cast blades as soon as these have been tested and are available.

Curtiss-Wright's Metal Processing division is working with several different methods of fabrication, including precision forgings, shell casting, some hot rolling and finishing by forging, while keeping watch on the Buick cold-rolling blade studies by Delco.

Buick, the survey report showed, is working on rough forgings and sintered metal blade developments, in addition to the cold-roll process.

▶ **High Forging Costs**—As an example of the high costs of forgings, it was pointed out that a die for precision forging, which costs about $500, is good for only about 800 blades. Finished precision forged blades cost $1.85 to $2, as compared to a finished shell-cast blade cost of $1 to $1.50 and the much lower potential cost of future cold rolled blades.

SBAC's Tips on Weight Reduction

Weight saving is getting the spotlight in British aircraft circles. About 1,000 designers and technicians visited a recent display organized by the Society of British Aircraft Constructors' weight control panel at the Royal Aircraft Establishment, Farnborough.

Numerous pieces of equipment were shown to illustrate how the designer can control aircraft weight in the various progress stages—project, detail and development. British weight engineers set up these fundamentals for control guidance:

- Can the part be eliminated?
- Can it be made smaller?
- Is it placed most efficiently?
- Is it made of the most efficient material?
- Is it fabricated in the most efficient manner?

Small items such as rivets offer big weight-saving possibilities, SBAC says. On a modern 140-ton aircraft, there are about 2 million rivets with a total weight of about 1 ton, it is reported. By cutting rivet length a fraction of an inch, the designer can save 200 lb., SBAC says.

Putting extra thickness in skin only where it's needed, is another weight-saving consideration. Where skin has to be slightly thicker to accommodate riveting of narrow stringers, the skin can be machined for an overall thinness except along the narrow bands where it is to be riveted.

BOEING B-47B STRATOJETS in a rare formation photo. These 600-mph.-plus bombers require new manufacturing techniques.

Building Boeing's Stratojet

MATING B-47'S 18-ton wing to the fuselage is a delicate operation (left). A crane swings the sweptback wing around, then lowers it gingerly into position for final attachment in the vicinity of the medium-bomber's bomb-bay and fuselage fuel tanks. The six 5,800 lb. thrust J47-GE-23 jet engines have not yet been hooked up.

REAR FUSELAGE SECTION (right), with tail assembly, is rolled forward to meet the Stratojet's center fuselage. This rear section was built by Temco Aircraft Corp., Dallas, under subcontract for Boeing Wichita. Temco typifies the large network of highly skilled organizations necessary for big-scale production of modern military aircraft. The subcontractor furnishes the rear fuselages ready for assembly, with equipment installed. Just visible at the extreme right is the Stratojet's Rato compartment. Note the large, wheeled dolly having numerous adjustments for properly positioning the fuselage section to assure proper mating. A high priority production item, the B-47 will also be built by Lockheed Aircraft Corp., at Marietta, Ga., and Douglas Aircraft Co., Tulsa, Okla.

Simple Change Cuts Milling Cost

A simple machining change is paying big dividends for AiResearch Mfg. Co., Los Angeles.

AiResearch uses three dimensional duplicating machines to mill the blades of air turbines for its aircraft air conditioning units. For one type of turbine impeller, the company was using a 0.050 in.-diameter cutter with a flute length of 0.090 in. Because the cutter was fed in at .005 in. per pass, it required 50 passes to mill a single blade. Another disadvantage was the hand finish required to eliminate the lines left as a result of the many passes.

Now the cut is made in a single pass, as a result of a suggestion made by AiResearch duplicating machine operator John W. Prescott. The cutter used now has a flute length of 0.250 instead of 0.090. While this length would cut the full depth of the blade, it was first believed that tool costs would jump because the longer flutes would be weaker, break easier.

Tests showed this wasn't so. Old tools had a maximum life of three wheels, with an average life of 1½ wheels per tool. But the longer fluted cutter stood up for a maximum of 14 wheels and a minimum of six. Also, the tool supplier furnished the extra flute length at no additional cost.

Savings with the longer cutter were 48.47 hr. of machine time plus 50 hr. of hand finish time per 100 pieces—for a total of 97.87 hr. for this quantity run. Total six-month savings were approximately $4,200.

Al-Fin License

Al-Fin division Fairchild Engine & Airplane Corp., Farmingdale, L. I., N. Y., has licensed Aluminum Co. of America and Bohn Aluminum & Brass Corp. to use Al Fin molecular bonding process.

Certificates Of Necessity

Accelerated tax amortization for manufacturers expanding their defense facilities is granted by the government in the forms of certificates of necessity.

In the following list of recent certificates, company name is given, followed by product or service, cost of construction deemed necessary for defense expansion but of no likely civilian use after the emergency, and the percentage of the expansion cost allowed for fast tax write-off. Fast write off permits property to be depreciated in five years.

- **Stalol Mfg. Co.**, Keene, N. H., aircraft parts, $85,256, 60%.
- **Stalol Corp.**, Providence, R. I., aircraft parts, $15,931, 60%.
- **Majestic Aircraft div. of Majestic Metal Specialties,** Meriden, Conn., aircraft parts, $22,500, 65%.
- **The Bassick Co.**, New Haven, Conn., ordnance and aircraft parts, $120,036, 50%.
- **Danbury Stainless Grinding Co.**, Danbury, Conn., aircraft parts, $40,500, 70%.
- **Synchro Dealers, Inc.**, Ferndale, Mich., aircraft parts, $48,801, 65%.
- **Boones Die, Tool and Stamping Co.**, Columbus, Ohio, aircraft parts, $132,540, 70%.
- **Marquette Metal Products Co.**, Cleveland, aircraft parts, $50,710, 75%.
- **Universal Machine Co., Inc.**, Fenton, Mich., aircraft parts, $22,580, 60%.
- **Sur-Way Sure Seal Inc.**, Detroit, ordnance and aircraft components, $63,000, 65%.
- **Reynolds Metals Co.**, Grand Rapids, Mich., aluminum extruded shapes for aircraft, $127,157, 65%.
- **Mechanical Products Inc.**, Jackson, Mich., aircraft parts, $210,143, 70%.
- **Metalcrafters Inc.**, Kenton, Ohio, aircraft parts, $30,047, 60%.
- **Lake Shore Machine Co.**, Euclid, Ohio, aircraft parts, $20,685, 70%.
- **General Metoss Corp.**, Vandalia, Ohio, aircraft parts, $505,900, 65%.
- **Majestic Machine and Tool Corp.**, Dearborn, aircraft parts, $10,630, 65%.
- **Allied Products Corp.**, Hillsdale, Mich., aircraft parts, $354,205, 65%.
- **Metalsrollers, Inc.**, Columbus, Ohio, aircraft parts, $33,823, 80%.
- **Falloo Mfg. Co., Inc.**, Springfield, Ohio, aircraft parts, $23,357, 60%.
- **Volcano Engineering Co.**, Detroit, experimental parts for ordnance and aircraft pilot models, $78,139, 70%; $70,690, 30%.
- **Michigan Steel Casting Co.**, Detroit, aircraft parts, $5,695, 65%.
- **The Goodyear Tire and Rubber Co.**, Akron, airplane parts, $472,835, 50%.
- **Miller Industries**, Jackson, Mich., aircraft parts, $41,025, 65%.
- **Regco Forge and Engineering Co.**, San Pedro, Calif., aircraft parts, $25,870, 60%.
- **Elliott Engineering Co.**, Lynwood, Calif., aircraft parts, $12,720, 60%.
- **Sargent Engineering Corp.**, Huntington Park, Calif., aircraft parts, $715,000, 70%.
- **Hiller Helicopters**, Palo Alto, Calif., helicopters, $498,152, 65%.
- **Chrysler Corp.**, San Leandro, Calif., aircraft parts, $6,680,478, 50%.
- **Meehee Tool Co.**, Culver City, Calif., aircraft equipment, $600,000, 65%; $2,150,589, 65%.
- **Drayer-Hanson Inc.**, Los Angeles, Calif., aircraft parts, $81,720, 65%.
- **Lockheed Aircraft Corp.**, Burbank, Calif., aircraft, $1,153,056, 60%; $2,382,000, 65%.
- **Ryan Aeronautical Co.**, San Diego, Calif., aircraft parts, $53,950, 60%; $382,000, 60%; $724,222, 60%.
- **The E. B. B. Mfg. Co.**, Los Angeles, Calif., aircraft parts, $104,330, 75%.
- **Solas Aircraft Co.**, San Diego, Calif., aircraft parts, $103,053, 65%.
- **Taylor Fibre Co.**, LaVerne, Calif., aircraft parts, $11,232, 50%.

40% of the Aircraft Oils used by major airlines in the U.S. is supplied by SINCLAIR...

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SINCLAIR REFINING COMPANY, AVIATION SALES, 600 FIFTH AVENUE, NEW YORK 20, N.Y.

- **Western Screw Products Co.**, Lynwood, Calif., aircraft parts, $40,000, 45%; $89,224, 70%.
- **Rheem Mfg. Co.**, Downey Calif., ordnance $866,520, 65%.
- **Com Air Products, Inc.**, Los Angeles Calif., aircraft parts, $164,441, 80%.
- **Bonner Machine Works, Inc.**, El Segundo, Calif., aircraft parts $128,428, 65%.
- **G. M. Giannini and Co., Inc.**, Pasadena, Calif., aircraft parts $7,462, 75%.
- **Hampton Engineering Co.**, Los Angeles, Calif. aircraft components, $26,681, 80%.
- **Technical Products Co.**, Los Angeles, Calif., aircraft parts $131,809, 70%.
- **Double T Products**, Hawthorne Calif., aircraft parts $74,545, 70%.
- **E. S. E. Engineering and Mfg. Co.** South Gate Calif., aircraft parts $43,048, 75%.
- **Clary Multiteller Corp.**, Los Angeles, Calif., reconditioning of aircraft bearings $10,639, 65%.
- **The Forest Co.**, Los Angeles Calif. aircraft parts $15,693, 80%.
- **Boeing Airplane Corp.**, Seattle, Wash., aircraft, $133,656, 65%.
- **G. C. and F. Tool Co.**, Berkley, Mich., aircraft parts $13,800, 75%.
- **R. & M. Manufacturing Corp.**, Ferndale Mich. aircraft parts, fixtures, gages, dies $148,833, 65%; $49,320, 75%.
- **Shakespeare Co.**, Kalamazoo, Mich., aircraft parts $18,610, 75%.
- **The Leland Electric Co.**, Dayton Ohio aircraft parts $62,840, 75%.
- **Scott Brownie Corp.**, Newtown, Ohio aircraft parts $2,533, 80%.
- **Borg-Warner Corp.**, Muskegon Heights Mich. nose beam aircraft $47,216, 65%.
- **Frank J. Slolitzka and Son**, Akron Ohio aircraft and ordnance parts $8,677, 65%.
- **Motor Wheel Corp.**, Lansing Mich., aircraft brake drums $15,662, 65%.
- **The Kawneer Corp.**, Niles, Mich., aircraft parts $1,847,211, 70%.
- **Maks Machine Co.**, Detroit aircraft parts, $65,806, 50%; $50,035, 70%.
- **Prevost Forged Products**, Detroit ordnance and aircraft parts $13,305, 70%.
- **Chicago Forging and Mfg. Co.**, Chicago, aircraft parts, $70,043, 75%.
- **General Motors Corp.**, Anderson, Ind., aircraft engine components $2,087,478, 65%.
- **Larson & Bolsley**, Chicago, aircraft machinery, $13,895, 80%.
- **Pioneer Tool & Engineering Co.**, Chicago aircraft machinery, $30,195, 65%.
- **Anderson, Inc.**, Chicago, aircraft components, $15,764, 80%.
- **Thompson Industries Inc.**, Indianapolis, airplane parts, $12,943, 65%.
- **Twing Industries Inc.**, Terre Haute Ind., aircraft components $8,711, 80%.
- **Olmile Mfg. Co.**, Skokie, Ill., aircraft parts $1,295,827, 65%.

"I understand how you feel about the Russians, Higgins, but the rules still call for a red flag"

Railway Progress

- **Bendix Aviation Corp.**, South Bend, Ind., aircraft parts, $676,506, 65%.
- **J. I. Case Co.**, Mt. Pleasant, Wis., aircraft parts, $320,000, 65%.
- **Deadick Tool Works**, Chicago, aircraft parts, $16,500, 65%.
- **Denran Electric Mfg. Co.**, Lafayette, Ind., aircraft parts, $51,264, 75%.
- **Cannelloe Co.**, New Brighton, Minn., aircraft parts, $18,042, 75%.
- **Brndix Aviation Corp.**, Davenport, Iowa, aircraft accessories, $85,734, 65%.
- **Pioneer Machine Products**, St. Louis, aircraft parts, $38,723, 50%; $8,206, 75%.
- **Cessna Aircraft Co.**, Wichita, airplanes and parts, $49,089, 65%.
- **Cramer Posture Chair Co., Inc.**, Kansas City, Mo., aircraft parts, $133,508, 60%.
- **The Coleman Co., Inc.**, Wichita, aircraft parts, $491,250, 65%.
- **Trans World Airlines, Inc.**, Kansas City, Mo., transportation figures not given.
- **Deere Mfg. Co.**, Dubuque, Iowa, aircraft landing gear, $442,000, 65%.
- **Wichita Precision Tool Co.**, Wichita, special tooling for aircraft, $30,001, 60%.
- **Omaha Productions Co.**, Omaha, aircraft products, $55,933, 65%.
- **Delavan Mfg. Co.**, West Des Moines, Iowa, aircraft parts, $215,000, 65%.
- **Douglas Machine Works**, Tulsa, aircraft parts, $16,057, 65%.
- **Spartan Aircraft Co.**, Tulsa, overhaul of aircraft and parts, $325,647, 65%.
- **Monleve Mfg. Co.**, Los Angeles, component parts of aircraft, $6,735, 50%.
- **Los Angeles Standard Rubber Co.**, Los Angeles, aircraft parts, $8,030, 50%.
- **Kieger Machine Co.**, Los Angeles, aircraft parts, $71,695, 25%; $35,540, 70%.
- **Dynamic Air Engineering Inc.**, aircraft parts, $15,683, 70%.
- **Downey Machine Co.**, Downey, Calif., aircraft parts, $66,666, 76%.
- **Swedlow Plastics Co.**, Los Angeles, aircraft parts, $150,506, 50%.
- **The Dieron Co., Inc.**, Los Angeles, aircraft accessories, $94,764, 65%.
- **Martin Aircraft Tool Co.**, South Gate, Calif., aircraft tools, $7,805, 75%.
- **AiResearch Mfg. Co. of Aris.**, Phoenix, aircraft parts, $2,635,626, 65%.
- **Alliance-Western Co.**, Los Angeles, aircraft parts, $102,256, 60%.
- **Bishop Machine Works**, Los Angeles aircraft parts, $75,001, 76%.
- **National Tapered Wings, Inc.**, Los Angeles, aircraft parts, $247,382, 76%; $47,060, 26%.
- **Rooster Douglas Corp.**, Riverside, aircraft subassemblies, $17,515, 70%.
- **Axelson Mfg. Co.**, Vernon, Calif., aircraft parts, $400,362, 65%.
- **General Metals Corp.**, Burbank, aircraft parts, $48,585, 65%.
- **Mueller Co.**, Los Angeles, fittings for aircraft, $3,550, 65%.
- **Glidden Products Glendale Calif.**, aircraft parts, $52,705, 65%.
- **Talley Machine and Mfg.**, Los Angeles, aircraft precision work, $8,038, 70%.
- **Widemos Engineering, Inc.**, Culver City, Calif., aircraft parts, $53,470, 65%.
- **AiResearch Mfg. Co.**, Los Angeles, aircraft engine parts, $77,834, 65%.
- **Bruce Engineering Co.**, Gardena, Calif., aircraft parts, $75,000, 40%.
- **Rocket Jet Engineering Corp.**, Glendale, Calif., airplane parts, $71,015, 75%.
- **Alba Engineering Co., Inc.**, Los Angeles aircraft components, $114,365, 76%.
- **Douglas Aircraft Co., Inc.**, Santa Monica, Bell, Long Beach, El Segundo, Calif., airplanes and parts, $1,894,703, 65%.
- **Hydro-Aire Inc.**, Burbank, Calif., aircraft engine, $221,740, 65%.
- **Electrical Engineering and Mfg. Corp.**, Los Angeles, aircraft parts, $42,750, 65%.
- **J. C. Carter Co.**, Costa Mesa, Calif., aircraft parts, $150,000, 60%.
- **Signal Hill Machine Works**, Long Beach, Calif., aircraft parts, $15,735, 60%.
- **Mar Vieu Engineering Co.**, Los Angeles aircraft parts, $449,971, 70%.
- **Universal Equipment Co.**, Culver City, Calif., aircraft parts, $191,017, 65%.
- **Karl Douglas Co.**, Inglewood, Calif., aircraft landing, $55,125, 60%.
- **Pacific Airmotive Corp.**, Chino, Calif., aircraft parts, $21,521, 75%.
- **Laurel Steel Metal Prod. Co.**, Hollywood,

aircraft parts, $13,210, 60%
• **Pacific Airmotive Corp.**, Burbank, Calif., aircraft parts, $41,063, 75%
• **Behr Aircraft Corp.**, China Vista, Calif., aircraft parts, $1,200,710, 60%
• **Werth Manufacturing Co.**, Los Angeles, aircraft parts, $32,730, 50%; $28,608, 40%
• **Utility Tool and Die Mf'rs**, Pasadena, Calif., aircraft parts, $38,727, 60%
• **Marmon Products, Inc.**, Inglewood, Calif., aircraft parts, $5,662, 75%
• **Leckinger Machine and Exp. Co.**, Los Angeles, aircraft parts, $10,933, 60%
• **Lockheed Aircraft Corp.**, Van Nuys, Calif., aircraft, $42,241, 60%
• **O and M Machine Co., Inc.**, Los Angeles, aircraft components, $21,870, 70%
• **Modern Metal Spinning and Mfg.**, Los Angeles, components for aircraft, $12,619, 70%
• **El Serano Machine Works**, Azusa, Calif., aircraft parts, $74,000, 60%
• **Duncan Industries**, Los Angeles, aircraft bolts, $21,180, 60%
• **Nanschotz Engineering Co.**, Los Angeles, aircraft parts, $18,737, 80%
• **Collins Engineering Co.**, Inglewood, Calif., aircraft parts, $127,470, 60%
• **Borrongks Adding Machine Co.**, Plymouth, Mich., aircraft parts, $1,800,000, 65%
• **Robbins Engineering Co.**, Highland Park, Mich., aircraft parts, $100,000, 60%
• **Buhl Mfg. Co.**, Detroit, aircraft parts, $8,977, 70%
• **Hammer Tool and Die Co., Inc.**, Detroit, aircraft parts, $9,412, 80%
• **Michigan Steel Castings Co.**, Detroit, aircraft parts, $12,018, 65%
• **Packard Motor Car Co.**, Detroit, aircraft parts, $2,130,300, 60%
• **Goodyear Aircraft Corp.**, Akron, aircraft parts, $498,941, 60%; $110,144, 60%
• **Aircraft Fitting Co.**, Cleveland, aircraft parts, $33,480, 50%
• **Hobart Brothers Co.**, Troy, Ohio, aircraft components, $61,932, 75%
• **American Welding and Mfg. Co.**, Warren, Ohio, aircraft parts, $1,051,160, 60%
• **Adams Engineering Co.**, Selon, Ohio, aircraft parts, $180,000, 60%
• **Photowitch Inc.**, Cambridge, Mass., aircraft parts, $150,000, 50%
• **Bellestone Corp.**, Stamford, Conn., aircraft parts, $10,030, 70%
• **Foan Mfg. Co.**, Hartford, Conn., helicopter parts, $9,922, 70%
• **Olson Mfg. Co.**, Worcester, Mass., aircraft parts, $65,901, 70%
• **Raytheon Mfg. Co.**, Newton, Mass., electronic equipment, $110,125, 60%
• **Safeway Heat Elements, Inc.**, Middletown, Conn., aircraft parts, $22,700, 65%
• **Sinclair Products Co.**, Windsor, Vt., aircraft parts, $11,100, 80%
• **J and L Mfg. Co.**, Bridgeport, Conn., parts for aircraft, $24,565, 70%
• **Aerovox Corp.**, New Bedford, Mass., electronic equipment, $118,963, 65%
• **Florence Stove Co.**, Gardner, Mass., aircraft parts, $220,000, 65%
• **Handee Spring & Mfg. Co.**, Hartford, Conn., aircraft products, $31,003, 60%
• **Scott and Williams Inc.**, Laconia, N. H., aircraft parts, $281,400, 75%
• **G-O Engineering and Mfg. Co.**, Hartford, Conn., aircraft parts, $28,672, 60%
• **N. Y. Transformer Co., Inc.**, Alpha, N. J., aircraft parts, $100,000, 60%
• **Airborne Accessories Corp.**, Hillside, N. J., assemblies for aircraft, $130,458, 65%
• **Kollett Aircraft Corp.**, Camden, N. J., electronic equipment, $10,084, 70%
• **Bork Mfg. Co.**, Farmingdale, N. Y., aircraft parts, $4,230, 75%
• **Porter-Cable Machine Co.**, Syracuse, N. Y., actuator parts for aircraft, $42,000, 60%
• **Victor Flush Valve Co.**, Newark, N. J., aircraft products, $123,010, 60%
• **Frederick Flader, Inc.**, North Tonawanda, N. Y., aircraft parts, $40,000, 60%
• **Whippany Products Co., Inc.**, Whippany, N. J., aircraft parts, $80,785, 60%
• **Thermo Electric Co. Inc.**, Saddle River, N. J., aircraft parts, $60,000, 60%
• **Ferrand Optical Co., Inc.**, Bronx, N. Y., aircraft parts, $101,200, 70%
• **Intertype Corp.**, Brooklyn, N. Y., aircraft parts, $108,120, 60%
• **Rosedee Motors, Inc.**, Rockaway Township, N. J., aircraft compats, $493,000, 60%

Radar Timetable Up to the Airlines

- **Airlines could have the APS-42 by mid-1954.**
- **But it would take longer to get lightweight unit.**

By Philip Klass

The airlines could have 500 radar sets in operation by mid-1954 if they settle for the newly announced AN/APS-42 military radar, but if they hold out for a brand new lightweight radar such as described in the second article of this series last week, it could delay the date by three years or more. This conclusion is based on an AVIATION WEEK survey of three major radar manufacturers.

At the moment, two basic types of transport radar are up for airline consideration.

▪ AN/APS-42 radar operating on X-band (3.2 cm), is now going into use on all four-engine military transports. It is a general-purpose radar which provides ground mapping, ground-beacon navigation, and terrain and weather warning (AVIATION WEEK May 12, p. 56).

▪ A lightweight "airline" warning radar which would be designed primarily to spot dangerous terrain and weather, but would have no beacon navigation and only limited mapping features (AVIATION WEEK May 19, p. 50).

The Air Transport Assn. has prepared for airline consideration a preliminary specification describing the desired operational characteristics for this lightweight radar. Based on comments from the carriers, ATA will try to arrive at a general spec describing a radar acceptable to all interested carriers. The spec will then be turned to Airine to prepare the detailed radar specs.

In its present form, the ATA spec says the radar should be able to penetrate heavy rain (over 75 mm/hr.) up to 15 mi. in depth. ATA suggests that this be accomplished by using a radar wavelength of 5-6 cm. However, the spec might revert to the familiar X-band if Navy tests this summer show that moisture attenuation of X-band energy isn't a serious problem.

▶ **APS-42s Soon**—The first APS-42 deliveries could begin within a year, and the airlines could have 500 sets within 15 months after they were ordered. This AVIATION WEEK estimate is based on talks with RCA and Navy personnel.

APS-42 complexity pays off in MATS world-wide operations where there are few ground navigation aids. But the airlines think a simpler unit may do for them.

This relatively short delivery is possible because RCA is currently producing APS-42s in sizeable quantities. Two other suppliers, Du Mont and Bendix Aviation's Pacific division, are tooling up and will soon be in production.

Special Report

General-purpose transport radar or lightweight warning radar? If the airlines want a general-type unit, such as Navy's recently announced APS-42, they could probably have it in full operation by mid-1954, if they desire a new lightweight unit, stripped of its navigational features, operation date would likely be pushed back to end of 1957. In this third and final article of a series, AVIATION WEEK's Avionics Editor studies the various factors which will influence the airlines' decision.

Assuming no sudden "hot war" increase in military demand, airline APS-42s could come rolling off the line because these three manufacturers will soon be tooled and their supply channels will be established.

▶ **Already "Debugged"**—Many reliability and maintenance weaknesses in the original APS-42 design showed up during more than 5,000 hr. of military flight testing. For example, BuAer says that each of the early APS-42s needed an average of three hours maintenance per day to keep it operating.

Today's APS-42 has been through three redesigns to improve its dependability and ease of maintenance. BuAer says the results are beginning to show.

This is no guarantee that there won't be future problems, but at least the major "bugs" should be out of the equipment. As a result, the airlines could order APS-42s without running their own service tests, observers say. The other function of airline prototype tests—familiarizing flight and maintenance personnel with the APS-42—

Air Weakness

Airborne radar has only limited ability to warn of possible collision with other aircraft. The tiny radar echo ("blip") from another plane is easily masked by terrain or precipitation.

If a pilot has reason to suspect other aircraft are in the area and scrutinizes his radar scope carefully, he can spot another plane up to perhaps 4-5 mi. away. But in normal use, the pilot will glance at his scope only occasionally.

The greatest danger of air-to-air collision exists in terminal (airport) areas. Here, ground-based radar should be able to maintain proper aircraft clearance.

could be done at military facilities and aboard military aircraft.

(Military personnel are keenly interested in the airline radar program. They indicated to AVIATION WEEK that arrangements could probably be made to loan the airlines a small number of APS-42s in the near future for familiarization tests.)

Allowing 15 months for delivery of the full 500 radars, and another six months to complete airline installations, the airlines could have 500 sets in operation within 21 months. So if they act promptly, the date could be mid 1954.

▶ **The APS-42 Lesson**—It has taken five years to get the APS-42 in production. Some of this delay can be charged to the original (not RCA) APS-42 contractor's lack of previous radar experience (AVIATION WEEK May 12). Some resulted from the increased complexity of the APS-42 over its APS 10 predecessor.

However, a portion of the long APS-42 gestation period must be charged to the fact that it takes time to get any new complex equipment into production.

In the face of early APS-42 troubles, it seems doubtful that the airlines would order a brand new lightweight radar on a fleetwide basis without a prototype testing and debugging program. This is the factor which would most seriously delay the new lightweight radar.

▶ **Lightweight Radar Timetable**—A survey of three radar manufacturers indicates that they would probably need 18 months to develop design and build six prototypes of the new lightweight 5-6 cm radar. If airline installation and flight test required another nine months, it would take a total of 27 months to establish and prove the design.

This assumes that only minor redesigns prove necessary as a result of airline tests and that these can be quickly incorporated before airline tests end.

Only at the end of this 27-month period could the manufacturer safely begin tooling and ordering materials. Lead time in obtaining materials might be the limiting item because of growing military demands for electronics.

The first lightweight radars might dribble out 20 months later, but another six months (minimum) would be needed to produce 500 radars. Thereafter, radar production could be 50 to 100 sets per month, radar manufacturers told AVIATION WEEK.

Allowing six months after final delivery before the last of the 500 radars was in operation, the entire program would have run 59 months (27 + 26 + 6). This would place the "in operation" date late in 1957.

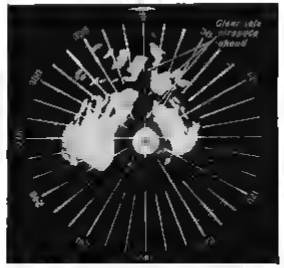
▶ **Can It Be Shortened?**—Several radar industry engineers told AVIATION WEEK that they thought the proposed switch from X band to 5-6 cm would not in itself delay the program much. Perhaps two or three months could be lopped off the schedule if the radar were designed for the familiar 3.2 cm.

A significant cut could be made in the 59-month cycle if the airlines were willing to place fleetwide orders without a prototype flight test program. APS-42 history makes this unlikely.

A radar industry engineer suggested another alternative, literally "stripping down" the APS-42 design to just those features the airlines want. Thus much APS-42 tooling and many of the same components could be used. Also, the airlines might risk production of a stripped-down APS-42 without a prototype flight test program.

At the moment there are too many variables to justify even a "guestimate"

CHIN ON MATS C-97 houses APS-42, details of which have been released, although equipment itself is still restricted.



SCOPE SHOWS clear path for aircraft through weather and terrain obstacles

of a timetable for a stripped down APS-42.

▶**Price Comparison**—APS-42s (from one manufacturer) sell for about $12,000 in quantities of 500 sets. If airline orders were pyramided on military requirements, the price might fall to between $10-12,000.

The less complex lightweight airline radar should be cheaper than the APS-42, if produced in the same quantities. However, unless most U. S. airlines decide to buy radar for fleetwide installations, the quantities of lightweight radar will be smaller than APS-42 orders.

In addition the airlines would have to foot the entire cost of the new radar development themselves. This cost would be increased by the switch from X-band to 5-6 cm.

Frank White, ATA's radar specialist, thinks a radar built to ATA specs should sell for about $8,000. But an average of "guestimated" prices from two radar manufacturers works out to about $12,000. It appears that the two radars will carry comparable price tags, providing the airlines can muster an initial order for at least several hundred of the lightweight radars.

The airlines could order as few or as many APS-42s as they wished without seriously affecting its price, because of existing military orders. But unless the airlines place simultaneous orders for at least several hundred of the lightweight radars, initial tooling and development costs could skyrocket the price.

However, the airlines will look at more than just the original price tag in making their decision on the type radar to buy.

▶**Weight and Maintenance**—The APS-42 weighs about 175 lb., uninstalled. Frank White feels that the new lightweight radar could be built to weigh about 110-120 lb. Considering the number of APS-42 features which would be eliminated (AVIATION WEEK, May 19), this appears to be a reasonable estimate. Also, miniaturization techniques

Fail-Safe Feature

"Radar's inherent fail-safe quality is one of its biggest advantages," says R. W. Ayer who formerly headed AA's radar project and is himself a pilot. "Any malfunction either causes complete loss of scope picture or such distortion and irregularity as to immediately alert the pilot of failure," Ayer says.

developed since the APS-42 was designed (1947-48) should give further weight saving.

A 55-65 lb. weight saving over the APS-42 means real dollars in a carrier's pocket. The exact dollar value depends upon the airline, airplane type and other factors.

Generally speaking, the cost of maintaining equipment increases as the square (or higher power) of its complexity. On this basis, the lightweight radar offers further savings. It should also be easier to train operating and maintenance personnel, although the carriers won't be able to use existing military APS-42 test equipment or training aids.

▶ **"Common System" Considerations**—The military have an indirect stake in the type of radar the airlines select. Plans are already laid for the military to take over several hundred airliners in event of national emergency.

If the airlines buy a 5-6-cm. radar, it cannot be used with existing X-band military radar beacons. The airline radar with only a pencil-shape beam, would give inferior land mapping. The 5-6-cm. wavelength would also give poorer definition. These are significant shortcomings for military use in world-wide operations.

A MATS spokesman says this wouldn't be too serious if airliners could be scheduled solely for military transport duty within the U. S., freeing APS-42-equipped planes for service elsewhere.

▶ **Another Factor**—There is an interesting sidelight to the Navy's recent decision to declassify information on the APS-42. The radar equipment itself is not declassified, for the present. The military does not want the actual radars to fall into unfriendly hands.

The State Department's export license control could prevent initial sales to undesirable foreign customers. But if the radar by itself, or as a part of an airliner, were sold to a "friendly" foreign airline, the U. S. would not be able to prevent its resale later to an unfriendly government.

Until this situation is clarified, the airlines probably couldn't buy APS-42s even if they wanted to. If and when commercial sales are permitted, the military may insist upon a provisional sales contract with equipment recapture rights. One observer has suggested an interesting solution to this problem, but one which raises other problems.

▶ **"Lend-Lease"**—If the military owned the airline radars, they would obviously control their sale. By renting their APS-42s, the airlines would be spared a heavy initial investment.

However, the military might not want to establish such a precedent with the airlines. And the airlines might not want the added bookkeeping and accountability problems. Most important, the military probably does not have the funds or agency to set up such an arrangement.

▶ **The Future**—ATA says that airline interest in radar was never higher. AVIATION WEEK's survey indicates that at least three major radar manufacturers are very much interested in the airline program, others are looking into it.

During the coming months, ATA will have its troubles as it tries to resolve the question. What type radar can best meet the airline needs and pocketbooks? After the radar manufacturers have had a look at the ATA spec, and come up with price and delivery estimates, ATA may have to revise its spec again.

Regardless of the type radar selected, the airlines will find the program expensive. It may cost $20,600 per radar, if spares, installation, training and other items are lumped in.

The airlines will expect radar to return these dollars with interest. An American Airlines economic study, made in 1947, indicated that radar would pay its way financially in reducing accidents and in improving operations. With new and larger airplanes carrying more passengers, the cost of an accident or of flight cancellation has gone up considerably.

If radar can save an airline only one DC-7 or Super Constellation, it may pay for a fleetwide radar installation. Important, if less dramatic, economic returns should come from radar's ability to permit passage around and through thunderstorms.

These factors should provide the necessary impetus to carry the airline radar program over the obstacles which a program of this magnitude will face.

Noise Specialists

Avionics manufacturers faced with RF noise suppression problems in their equipment may get help from Astron Corp., which is offering the services of its noise suppression lab and staff to avionics manufacturers.

Astron Corp., 255 Grant Ave., East Newark, N. J.

Radiation Detector Under High Pressure

The radiation intensity of an atomic blast can be measured with a new small gamma radiation detector developed by General Electric and only recently declassified by the military. The detector has been used in research planes flying over atomic blast sites to warn of, and protect against radiation.

Less than 7 in. long and ¾ in. in diameter, the new detector is essentially an ionization chamber surrounded by a steel jacket. When gamma rays penetrate the steel shell, entering the chamber, they ionize argon gas within the chamber, causing current flow between two electrodes. The intensity of the radiation is proportional to ionization current.

GE has reduced the size of the detector by compressing the argon to unusually high pressures—50 times atmospheric.

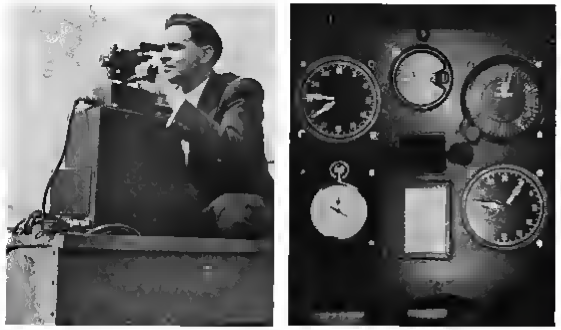
New Company To Make Transistors

A new company, Transistor Products, Inc., has been formed to manufacture transistors, the tiny replacements for vacuum tubes in certain applications.

The new company is a subsidiary of Purolator Products, Inc., manufacturers of automobile and other type filters. According to Ralph R. Layte, president of Purolator, the new company has purchased a license from Western Electric which holds transistor patents.

Dr. Roland B. Holt, former director of Harvard University's Nuclear Laboratory, will head Transistor Products' technical staff. Holt has developed new equipment for testing transistors which Purolator says should materially aid production.

Get in the Scrap—Turn Yours in for Defense



OPERATOR photographs plane while second camera records data shown at right.

Aussies Make Recording Camera

Inexpensive unit used in obtaining takeoff and landing performance is developed by Civil Aviation Dept.

(McGraw-Hill World News)

Melbourne—An inexpensive but accurate operational research camera to record takeoff and landing performance has been used by the Australian Department of Civil Aviation for some time now.

The instrument designed and built by the Department's own engineers, also gives data for computation of normal rates of acceleration and deceleration in landing and takeoff, and normal touch-down speed. (For an American development, by Fairchild Camera & Instrument Corp., see AVIATION WEEK Apr 28, p. 58.)

► **Components**—The complete equipment consists of a sighting head which swivels, console, automatic observer, wind speed and direction indicator, and batteries to provide power.

• **Sighting head** includes a view finder, 16-mm. camera for photographing the plane, and Autosyn transmitter mounted on top. The head is traversed in the horizontal plane by means of handle bars. A later version permits vertical rotation of the head 10 deg. down and 20 deg. up.

• **Console**, just below the sighting head, includes an inverter to convert d.c. power to a.c. for the Autosyn transmitter; a receiver for signaling the operator, and the control panel.

• **Automatic observer** has an instrument panel and a second 16-mm. camera for recording instrument readings. The instrument panel includes Autosyn panel indicators, a Weston thermometer bulb and indicator dial to record outside temperature, an ICAN sensitive altimeter, a stop watch and a slot to hold particulars about the aircraft being photographed.

• **Wind speed** and direction indicator gets power from the batteries which are rated to give full power for about an hour at continuous service, but up to eight hours in intermittent operation.

A single camera can cover a runway length of up to 2,500 ft. from a distance of about 200 yd. The direction indicating instruments for wind and line of sight of the camera are related to true or magnetic bearing by sighting with a magnetic compass immediately after setting up the equipment.

Rearward Seats Now Compulsory

(McGraw-Hill World News)

Melbourne—Backward seating for aircraft carrying more than six passengers is compulsory in Australia under a new government ruling. And the government has also suggested to the International Civil Aviation Organization that this regulation be made a world standard.

Imported and locally built aircraft will have to conform to the new Australian seating standard, with seats designed to take forces of 12G. In the interim, aircraft will have to improve their safety belts and seat attachments to take the 12G requirement.

Officials say that rearward seating will lower air crash fatalities at least 25%, with the increased weight not expected to exceed five pounds per passenger.

Analyzer Conference

The Scintilla Magneto division of Bendix Aviation is scheduling a three-day conference, June 24-26, to discuss ignition and engine analyzer installation, training, and useage problems. The industry-wide meeting will be held at Lake Oquaga, adjacent to the Scintilla plant in Sidney, N. Y.

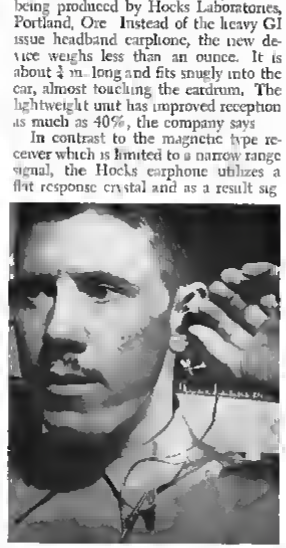
According to Scintilla, the military and airline response to analyzers has been so overwhelming that the industry has not been able to establish prescribed installation, training, and useage procedures.

The meeting is not limited to users of the Scintilla analyzer. Pan American Airways, with considerable Sperry analyzer experience, is expected to attend, a Scintilla spokesman said.

New Earphone Gives Hearing Comfort

Earphone sets designed to ease pressure and eliminate rashes, numbness and earaches common among pilots are being produced by Hocks Laboratories, Portland, Ore. Instead of the heavy GI issue headband earphone, the new device weighs less than an ounce. It is about ¾ in. long and fits snugly into the ear, almost touching the eardrum. The lightweight unit has improved reception as much as 40%, the company says.

In contrast to the magnetic type receiver which is limited to a narrow range signal, the Hocks earphone utilizes a flat response crystal and as a result sig-



nals of high frequency range as well as audible waves are translated without distortion.

The inner ear receptacle is fitted individually with a wax mold. On the outside end of the receptacle is an individual volume control, and a single strand of small wire plugs into the instrument board panel.

The military and CAA have not yet approved the equipment, but it is being used by a few airmen both in and out of the armed forces.

Fighter Maintenance

Lockheed Aircraft Service Inc., Burbank, Calif., has received an Air Material Command contract for heavy maintenance on an undisclosed number of F-94 Starfire all-weather fighters. Contract is for about $6 million.

NEW AVIATION PRODUCTS

Torque Tool

A new air-powered torque tool, suitable for nut running and precise tightening where delicate equipment is involved, has been placed on the market by Garvin Brothers.

The device is built to give accurate control in the 0-25-in.-lb. range. Special gearing can be supplied to extend this to 40 in.-lb. A production tool, the Model MA-25 is accurate to 2% of torque limits, eliminating need for subsequent hand torquing inspections, the maker says. It is designed to be precise and safe enough for production jobs where a little too much torque would cause breakage or distortion of light metal parts, castings or plastics. Torque is set by using the built-in torque wrench as a gage. The tool stops when selected torque is reached.

The tool, with control box containing solenoid valves and switches, weighs 6 lb.

Garvin Brothers Inc., P. O. Box 536, South Bend 24, Ind.

Missile Coupling

In some cases, failures in guided missile launchings can be laid to the automatic disconnect coupling that secures the service line to the missile Couplings on occasion have been known to bind or "hang up" at firing time, causing the missile, at the least, to be unfavorably influenced in its direction of flight

A coupling with a special disconnect design and reportedly overcoming this failing has been developed by E B Wiggins Oil Tool Co It can be used for securing fuel supply lines to missiles and is leak tight when disconnected The unit can be remotely triggered by 24 v d-c current, also has a manual disconnect provision A solenoid within the assembly actuates the disconnect mechanism

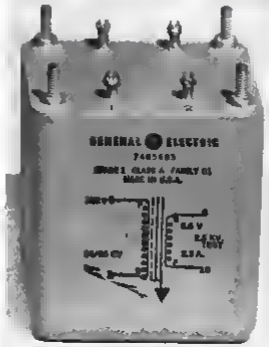
One-half of the connector (top in photo without solenoid) stays with the missile The other, on the end of the fuel line, automatically disconnects and falls to the ground when the missile is launched (For maximum fuel, missiles are "topped" at the last minute, because some missile fuels evaporate very quickly Other service lines are required up to and for firing)

The half of the new coupling that falls to the ground has "dogs" or fingers evenly spaced around the circumference of the mating section

The fingers are extended outward by spring action into a groove in the missile half of the coupling to lock the hose in place

A bumper guard around the bottom half of the unit prevents it from being damaged when it strikes the ground The assembly is made of aluminum alloy and currently is being produced in ¼- and ⅜-in tube sizes

E B Wiggins Oil Tool Co, Inc., Aircraft division, 3424 E Olympic Blvd, Los Angeles 23, Calif



Light Transformer

A new lightweight, high temperature transformer cast in Permafil, a solventless resin, has been developed by General Electric. The Permafil not only hermetically seals the transformer but also serves as its external case.

GE says the new cast Permafil construction reduces size about 20% and gives a lighter unit than comparable transformers of conventional design.

According to GE, the new units meet the requirements of MIL-T 27 Grade 1, although military approval of the new GE transformers is pending. No anti-fungus coatings are required because the Permafil is fungus resistant. At an operating temperature of 105C, the new units have a life comparable to standard hermetic transformers using Class A insulation. At 130C, GE says operating life should run 1,000 hours or longer.

The new cast Permafil transformers are now available in limited quantities. Full-scale production is scheduled for late this year.

General Electric Co., Specialty Transformer & Ballast Dept., Ft. Wayne, Ind.

ALSO ON THE MARKET

Mounting bases meeting Spec. JAN-C-172A are available in "off-center-of-gravity" and 30G shock models with non-linear spring vibration isolators from T. R. Finn & Co., Inc., 333 Jackson Ave., New York 54.

Boron carbide compound is available in various grit sizes in collapsible tubes for use in place of diamond powder in some applications. It can cut tungsten carbide, says Robert Marks Co., 47 Goddard St., Providence, R. I.

LETTERS

Strategic Bombing

The conflict in Korea has focused interest on the question of the strategic bomber's ability to operate successfully where strong modern jet fighter interception is encountered.

Unofficial reports from that theater indicate that the B-29s operating there have met with significant losses when attempting daylight bombing.

The implication may exist that experience gained since the start of the current conflict has altered the concept of the feasibility and value of strategic bombing.

Defense planners of the United States have avowedly leaned heavily on the threat of the strategic bomber to enforce peace for the past several years.

Has the contest of B-29 vs MiG-15 in Korea proven that the modern jet fighter as a defensive weapon has nullified or markedly lessened the potential of the modern strategic bomber?

The answer is "No" with the following observations offered to substantiate this conclusion.

Initially it should be noted, of course, that the application of the B-29 in Korea is not strictly in conformity with the classic concept of strategic bombing. Secondly, the B-29, stout old work horse that she is, cannot today be considered as representative of a modern strategic bomber.

In 1944-45, the typical defensive fighter plane's maximums of speed and altitude exceeded those of the B-29 by relatively small margins. The bomber, if intercepted at all, was able to defend itself rather adequately due to this near equality of performance. In 1952 the huge advantage performance-wise enjoyed by the current jet fighter over the B-29 makes the bomber's defense much more difficult. The formerly adequate fire control system is rendered much less effective with attacker's closing speed having increased several times over that of their World War II counterparts. Defense by escorting jet fighters is also rendered more difficult in some respects by this disparity in performance.

The strategic bomber of today must be capable of coming over target at minimums of 40,000 ft. of altitude and Mach 0.80. Inability to achieve either or both of these performance figures sharply reduces the bomber's probability of success against a defended target. Ability to equal or exceed these minimums of performance makes quite likely successful accomplishment of the bomber's mission even against a strongly defended target. The warning and interception problem for defending fighters has become tremendously difficult even with modern electronic aids when bomber operational speeds and altitudes have increased to the aforementioned minimums. This problem will typically be rendered more nearly unsolvable by the fast high-flying bomber making its attack during night time and/or bad weather.

This is the situation as it exists today and as it apparently will be for an indeterminate length of time. Increases in fighter speeds that are foreseeable in the near future will not markedly alter the concept as long as they employ presently conventional armament. It will be another story when and if target seeking air-to-air and ground-to-air missiles are perfected. When that day comes, the era of the piloted bomber will be drawing to a close.

ROBERT B. GORRELL
B-47 Engineering Project Pilot
Boeing Airplane Co.
Wichita, Kan.

Knots and Mph.

I refer to Cockpit Viewpoint in the Mar. 10th issue. Let's "Simplify Aviation" but not oversimplify attainment.

Few will deny that simplification must not and can not be limited to the domestic operations within the United States. A step toward simplification will be the adoption of universally accepted units of measurement. Capt. Rohson concedes some foreign units are superior to ours and that American delegates to ICAO cannot insist on all standards being American. From this, one might expect him to recognize, in the interest of standardization, the need for a certain amount of give and take among the world's aviation people.

But no! As we read on we find that some changes "simplify" and some "complicate" aviation. An example of the latter being the conversion of airspeed meters from statute miles per hour to knots. The criterion seems to be if a change is new to a pilot it's a "foreign language" unnecessary and unsafe."

Presumably then, if we are to simplify aviation we must convert the world to units used in United States domestic operations and thereby save thousands from death at the hands of those bewildered pilots who would otherwise be spinning in while translating knots to statute miles.

I have every confidence that pilots in the United States will safely adopt those few changes that international conventions may bring about and in most cases they will find them superior to the old systems. Wherever a new system is adopted by an appropriate agency, pilot groups would do well to educate their members in the factors underlying the change, the advantages in the new system over the old, and encourage them to quickly embrace the new in order to reap the benefits or to cooperate with the international operator who would have had a great deal more difficulty converting to our system.

I submit that it behooves those of us who are sincerely interested in simplified aviation to encourage rather than discourage changes necessary in international standardization of aeronautical terms and units of measurement.

FRANCIS J. JACOBS
Kaiser's Hill, Bay Crest
Huntington 12, N. Y.

Facts for Filing

Your new Reference Service feature, we feel, will be a valuable aid in locating important source material. We plan to make use of this feature in our library.

We suggest that organization charts of the various military services, with locations

would be the most helpful reference service which you could provide—at least, from the engineering, administrative or library view point

ELMA T. EVANS, Librarian
Cornell Aeronautical Laboratory, Inc
4455 Genesee St
Buffalo 21, N. Y.

Analyzer Background

We have read with interest your editorial in AVIATION WEEK May 5, entitled, 'What IS the Policy, Mr. Hensley?"

There are several aspects of this article which we feel require clarification. First of all, we, as representatives of the Scintilla Magneto division of Bendix Aviation Corp., were invited (by telephone) to this meeting by Mr. E. C. Marsh. The subject and nature of the meeting was unknown to us.

We attended this meeting and immediately learned that the subject of this discussion was incorrectly labeled, in as much as all parties concerned agreed that the real subject was ignition analyzers and not engine analyzers.

This is important in consideration of the value of this instrument as a contribution to airline safety. When it appeared necessary, we did state that we do not feel that the ignition analyzer is, or should be, a mandatory safety instrument. We feel, as did Mr. Marsh, that it contributed to safety but its major value was to increase the availability of airline and military aircraft. In other words, it is a newly developed electronic tool which increases or improves maintenance efficiency.

We, and certainly every airline executive, must be very cautious in terming every maintenance tool a safety device. With the inclination, this could probably be done and the result would destroy the practical purpose of the airplane.

During the course of this meeting, we also pointed out to the representatives of the Flight Engineer's International Assn. that, in our opinion, their fears of not obtaining ignition analyzer equipment were unfounded. We assured them that we had discussed the subject of ignition analyzers with the managements of the majority of airlines in this country, and many of those in foreign nations, and we were certain that these executives had a proper appreciation of the potential of the ignition analyzer and were taking immediate steps to procure it. Many have already done so. We did not feel that any statement made by Mr. Marsh in an air safety hearing would in any way deter or discourage these plans.

We would appreciate your publication of this letter in order that those concerned might know of our participation in this hearing. In all fairness to the parties concerned, and yet with no attempt to enter this controversy, we wish to add that, in our opinion, Mr. Marsh conducted this meeting in a fitting manner and did not offer evasive answers.

ROBERT BOYER, JR.,
Senior Sales Engineer
Scintilla Magneto division
Bendix Aviation Corp.
Sidney, N. Y.

WHAT'S NEW

New Publications

Aviation Fuels and Their Effects on Engine Performance is an authoritative manual attractively put together by Ethyl Corp. under contract for USAF and BuAer. It is a revised version of the booklet initially put out during World War II for the services. Included in the new volume is considerable information of general interest on turbine engine fuels.

The booklet is written for personnel concerned with engine operation design, development and operation, and though covering a highly technical subject is not complicated. The necessary data is neatly arranged.

The Science of Precision Measurement, compiled by the DoAll Co., is a thorough compendium on dimensional quality control. Packed with illustrations and formulas, the 256 page volume details processes for measuring to very high tolerances. There is also interesting background on the history of measuring.

The same firm also has available the **Band Tool Manual** aimed at tool engineers, supervisors, foremen and band tool operators. It is packed with how-to-do-it material and is fully illustrated.

The Science of Precision Measurement sells for $3.50, the Band Tool Manual for $2.00. Address The DoAll Co., Des Plaines, Ill.

Telling the Market

Engineering Bulletin 505-00 contains analysis of functions and applications of Regohm direct-acting finger-type voltage and current regulators. Write Electric Regulator Corp., 50 Day St., So. Norwalk, Conn. **Bulletin 223** covers Aeroquip hose assemblies and components, flange-type hose fittings and self-sealing couplings. Available from Aeroquip Corp., Jackson, Mich.

Plastic materials, products, techniques and facilities for research and development in protective plastic coating of electronics products are pictured and described in folder available from Emerson & Cuming Co., 126 Massachusetts Ave., Boston 15.

Catalog details and gives prices on Brady self-sticking identification products including wire and pipe markers, safety signs, reflective signs, masks and stencils and printed roll tape. Write W. H. Brady Co., Dept. 89, 1630 E. Spring St., Chippewa Falls, Wis.

Bulletin GEC-598A describes single-phase 60-cycle atomic-hydrogen arc

Welding equipment. Write General Electric Co Schenectady 5, N Y.

Riveting With Hi-Shears, written for shop riveters and inspectors, is nontechnical, colorfully illustrated booklet covering the use, trouble shooting, safety hints, and inspection of Hi Shear rivets. Write Hi-Shear Rivet Tool Co., 8924 Bellanca Ave, Los Angeles 45

Illustrated 32-page Catalog 14 650-3 lists nearly 700 styles of resistance welding electrodes, including Kaptrode type electrodes designed to conserve copper. Available from Weiger Weed & Co, division of Fansteel Metallurgical Corp, 11644 Cloverdale Ave., Detroit 4

O-Ring engineering handbook provides detailed design data to those in hydraulics or related fields. Write Plastic & Rubber Products Co., 2100 Hyde Park Blvd., Los Angeles 47

Revised folder on Alodine protective process also gives data on recently developed Alodine No. 600. Write American Chemical Paint Co, Ambler, Pa.

New Addresses

Corporation Aircraft Owners Assn. has moved from 1025 Connecticut Ave to 1029 Vermont Ave., N W., Washington 5, D. C Telephone number is unchanged Metropolitan 0714

Publications Received

- **The Army Air Forces in World War II, Volume III Europe—Argument to V-E Day (January 1944 to May 1945),** edited by W F Craven & J L. Cate, The University of Chicago Press, 1951, $8 50—The third of seven volumes continues the story of the air war in the European and Mediterranean theaters
- **They Fought With What They Had Army Air Forces in Pacific 1941-1942,** by Walter D Edmonds, published by Little Brown and Co, Boston, 1951, $5 00
- **Typical Helicopter Performance Calculation,** by R. J Harris, L H Sloan & K W Ulrich, published by Rotorcraft Publishing Committee, Norton, Pa., 1952, $1 25 A practical guide for the interested individual who wishes to make a complete performance analysis of any helicopter
- **Key Role of Aircraft Industry and Selected Individual Company Analyses,** prepared by Selig Altschul, published by Kidder, Peabody & Co, 17 Wall St, New York 5, N Y, 1952 This interesting and informative study compiled from statistical services, trade and other sources deemed reliable, includes analyses of ten major corporations
- **Symposium on Structural Sandwich Constructions,** published by the American Society for Testing Materials, 1916 Race St, Philadelphia 3 This symposium of eight significant papers, illustrated, with numerous bibliographical references, charts and graphs, should be of particular value to those responsible for the design and construction of aircraft

BEA Revives Paris-London Luxury Run

- **New Elizabethans to fly daily luneh-time trips.**
- **Imperial began similar serviee 25 years ago.**

By Nat McKitterick

(McGraw-Hill World News)

London—British European Airways will introduce its first "name" service—at no extra charge—on its London-Paris run June 9.

Called the Silver Wing, the service will consist of lunch-time flights from London and Paris each day of the week, flown on the new Elizabethan transports which have been quietly fed into service on BEA since April. Passengers will get a hot meal with champagne for the normal fare of about $24.75—just a hair under what it costs to go London-Paris on the crack Golden Arrow rail service.

▶**An Old Service**—The Silver Wing is actually a revival of an old service. Twenty-five years ago Imperial Airways, BEA's predecessor on the Londoo-Paris run, maugurated a "luxury" service called Silver Wing, using Armstrong Whitworth Argosies, carrying 18-20 passengers, and powered with three Armstrong Siddeley Jaguar engines of 420 hp. each.

The Elizabethan is hardly less of a novelty than the old Argosy. The only important high-wing civil transport in regular service, the aircraft has a completely different configuration inside as well as outside. Passengers will like the all-round view available from every seat, when British weather permits any view at all. And the wide cabin, shaped like a sawed-off pyramid, gives the impression of more room than conventional transports of this size. As one BEA official put it, "It isn't just another furnished tube."

▶**Elizabethan Seating**—BEA has nine Elizabethans in service now—four 47-seaters on the London-Paris run (only 40 seats sold for the Silver Wing) and the others, 40-seaters, scattered over BEA's Vienna, Nice, Milan and Stockholm runs—the wide spread designed to give BEA as broad operational experience as possible. The 16 forward seats face aft, the other 24 forward. This leaves two sets of seats in the middle facing each other—an attraction for traveling parties of four. BEA chose this arrangement for maximum use of space, not for any theories about the advantages of back-facing seats.

BEA figures the Elizabethan's operational habits are similar to the Convair 240. And BEA will be competing directly with Swissair Convairs on the London-Zurich run. Both airlines quote times of 2 hr. 20 min. for the flight.

The Elizabethan's two Bristol Centaurus engines are being worked up to a cruising speed of 260 mph. on 1,300 hp. per engine. Right now, while the aircraft is being broken in, both figures are a good bit lower. The aircraft cruises smoothly up to about 25,000 ft., noise level is about the same as in a Convair, its weight is 52,500 lb.

ELIZABETHANS to be used on BEA's Paris-London Silver Wing service boast .

LUXURY interiors. This view looking aft shows unusual seating arrangement.

▶**Planes on Order**—BEA ordered 20 Elizabethans from de Havilland's Airspeed division in February, 1948. All of these, plus an extra production model, should be in service by this time next year. Airspeed dubbed the aircraft Ambassador, but the name was changed by BEA when conflicts cropped up with Trans World Airlines' trans Atlantic luxury service, also called the Ambassador.

The length of time it has taken to get the Elizabethan into service indicates that Airspeed had its share of design and production troubles. Not all have been worked out yet. Most noticeable from the passenger viewpoint is the tendency for the cabin to overheat. BEA says aircraft coming from the fac-

Silver Wing Service, Old and New

	Imperial Airways.	BEA.
Aircraft	Armstrong Whitworth Argosy	de Havilland Elizabethan
Engines	3 Armstrong Siddeley Jaguars of 420 hp. each	2 Bristol Centaurus of 2,600 hp each.
Span	90 ft.	115 ft
Total weight	18,000 lb	52,500 lb
Crew	2 flying. 1 steward.	3 flying 2 stewards 1 stewardess
Passengers	18-20	40 (Silver Wing). 47 normal.
Cruising speed	95 mph.	245 mph
Time	Croydon-Le Bourget 2 hr. 50 min.	London Airport-Le Bourget 1 hr 30 mm.

BEA chart compares Imperial's luxury service 25 years ago with new Silver Wing.

tory now will have better refrigeration units

With bookings running up to 88% on the four London-Paris Elizabethans, BEA thinks it will show Air France its heels in the red hot competition on this heavy traffic run Trouble is, the new threat may force the French to ask renegotiations of their flight frequency agreements with the British The two lines are supposed to split the London-Paris traffic about 50 50, but the British are a bit ahead now and gaining

▶**DH Reluctant**—So far, BEA is the only airline to order Elizabethans De Havilland has had one or two feelers from other sources, but the company is reluctant, in the face of rearmament work and Comet prospects, to continue production of Elizabethans at Christchurch in the absence of really sizable orders BEA says it would like about six more.

A design of an Elizabethan with four Rolls-Royce Dart turboprops was also drawn up by DH and BEA, but that, too, looks like a casualty of rearmament BEA had hoped to standardize on the Dart engine The Vickers Viscount, four-Dart transport, of which BEA has ordered 20, is scheduled to come into service in October

Six Airlines List Executive Salaries

Six airlines have reported salaries, bonuses and stock holdings of their executives and directors during 1951. They are shown in the following list, with comparable 1950 figures in parentheses

▶**United Air Lines, Inc.**—W A Patterson, president and director salary $75,000 bonus* $7,300, holds 9,667 common shares and 241⅔ common shares legacy $72,038 $6,507 and 9,850 common) | Olis E Kline, executive vice president and director salary $31,018 bonus* $1,021, holds 7,500 common shares ($6,750 $295 and 7,500 common) | J A. Herlihy, vice president-engineering and maintenance and director salary $45,668, bonus* $3,024, holds 5,013 common shares ($42,561, $3,238 and 2,068 common) | D F Margarrell, vice president-transportation services salary $26,600 bonus* $1,890 holds 1,080 common shares ($22,773, $1,608 and 1,080 common shares) | D R. Petty, vice president-flight operations, salary $8,250, bonus* $495, holds no stock (no 1950 report) | Harold Crary, vice president-sales salary $20,966, bonus* $3,423, holds 3,400 common shares ($20,001, $3,138 and 3,172 common and 84 preferred shares) | Hal E Norse, vice president-economic controls salary $20,866, bonus* $6,005 holds 1,030 common shares ($19,531, bonus $1,030 and 1,000 common shares) | R. F. Ahrens, vice president-personnel, salary, $20,500, bonus* $1,653 holds 1,002 common shares ($19,603 $1,493 and 1,403 common shares) | R. W Ireland vice president-traffic administration salary $21,979, bonus* $2,895 holds 2,046 common shares ($23,609, $2,760 and 2,040 common shares) | Curtis Barkes, vice president-finance and property, salary $20,000 bonus $1,450 holds 451 common shares ($17,140, $1,137 and 751 common shares) | R. E Johnson vice president-assistant to president, salary $14,467, bonus* $905, holds 950 common shares (no 1950 report) | S F Martin, secretary and assistant to president, salary $12,900 bonus* $900 holds 600 common shares ($12,390, $820 and 750 common shares) | C. M. Blanchar, comptroller, salary $14,400 bonus* $765, holds 201 common shares ($13,950, $997 and 501 common shares) | A. M. DeVoursney, treasurer salary $10,430, bonus* $505 holds no stock ($3,333 and bonus $154, no stock) and the following directors: Martin C Anserge fee $900, holds 1,171 common shares ($900, 750 common shares and 100 preferred shares) | Gardner Cowles fee $900, holds 6,003 common shares ($600 and 1,100 common and 400 preferred) | Joslin W Dart, fee $700 holds 20,000 common shares ($800 and 19,400 common) | Paul M Godehe no fee holds 600 common shares (no fee and 600 common) | Paul G Hoffman fee $400 holds 135⅓ common and 7 preferred shares (no fee 100 common and 7 preferred shares) | Eric A Johnston, fee $800 holds 1,000 common shares ($500 and 1,000 common) and John J Mitchell, fee $900 holds 4,302 common shares (3000 and 4,002 common) | *Retirement plan and group life insurance plan

▶**Continental Air Lines Inc.**—Robert F Six president, salary $33,000, no bonus, holds 1,003 common shares ($32,750 and 1,000 common shares) | C C West, Jr vice president, salary $17,376, holds 440 common shares (no 1950 report) | Joseph A. Uhl vice president-secretary treasurer, salary $14,912 holds 1,217 common shares ($14,191 and 1,217 common shares) | Harry C. Short, vice president-engineering maintenance, salary $7,812 holds no stock (no 1950 report) | O. R. Heuster, vice president-operations, salary, $17,376, holds 703 common shares ($16,375 and 703 common shares), | Stanley O Halberg vice president-traffic and sales, salary $7,437, holds no stock (no 1950 report) | Lyne H Daniels, vice president-flight service salary $7,083, holds no stock (no 1950 report) | Dorothy Ford assistant secretary, salary $4,668 holds 50 common shares, ($4,275 and 50 common shares) | Louis H. Mueller, director and chairman of the board no salary holds 82,400 common shares (no 1950 report) | Sheldon G Cooper director and general counsel no salary, directors fee $800, holds 1,800 common shares (no fee and 5,000 common shares), and the following directors Lawrence C. Ames directors fee $850 holds 11,700 common shares 10,500 common shares) | L. S Daniels directors fee $300 holds 14,500 common shares (14,000 common shares) | F L. Ehrman fee $100, holds 2,000 common shares (no 1950 report) | Marco F Hellman fee $900 holds 5,000 common shares (4,500 common shares), | Josiah G Holland, fee $100, holds 2,300 common shares (2,300 common shares), | F H Ricketson Jr. fee $100, holds 4,300 common shares (4,000 common shares) | Thomas Roberts, no fee holds 82,050 common shares 182,050 common shares)

▶**All American Airways, Inc.**—Robert M Love president and director salary $15,000 holds 55,846 common shares ($15,000 and 79,845 common) | C W Wendt secretary-treasurer, salary $11,666 holds 5,000 common shares ($10,000 and 5,000 common) | D L. Miller, vice president and director, salary $8,000, holds 970 common shares 187,500 and 27 common) | C H. McIntosh vice president-operations salary $10,500 holds no stock, $10,000 and no stock) | W J Short, assistant treasurer, salary $6,000 holds 60 common shares ($6,000 and no stock) | H G Kenyon, assistant secretary salary $5,950, holds no stock ($5,700 and no stock) | E K. Arnold, secretary, salary $5,700, holds no stock ($5,300 and 500 common shares), and the following directors: Merlin Fenton, holds 1,000 common shares (1,000 common) Hamilton Hale holds 1,500 common shares 11,500 common) | Harry Lunger holds no stock (12,500 common) | Malcolm E. McAlpin holds no stock (500 common) Hugh R. Sharp Jr, holds 700 common shares (200 common)

▶**Piedmont Aviation, Inc.**—T H Davis, president, treasurer and director salary, $15,000, holds 121,171 common shares ($12,250 and 120,671 shares), R D Hager, vice president, assistant to president and director salary $11,000, holds 6,850 common shares ($10,083 and 6,850 common), R. S Northington, vice president and director, salary $6,000 holds 4,400 common shares 185,400 and 4,400 shares) M F Fere, secretary and director salary $6,175, holds 3,501 common shares ($6,275 and 3,501 common), and the following directors: G E. Anderson, director's fee $125 holds 500 common shares ($170 and 1,000 common) Thurmand Chatham, 3,400 common shares (3,400 common) E. L Davis, Sr $135 directors fee holds 9,290 common shares ($175 and 15,000 common) | E L. Davis, Jr., fee $125 holds 4,640 common shares 15,175 and 4,640 common) Frank Dowd, fee $75,000, holds 1,000 common shares (no fee and 1,000 common), C E Norfleti fee $125 holds 5,000 common shares ($175 and 5,000 common).

▶**Resort Airlines, Inc.**—Clinton Davidson Jr. chairman, president and director salary $7,500, holds 48,307 capital shares (no salary and 50,000 capital shares), R Paul Wessner executive vice president and director salary $14,375 holds no stock (no 1950 report), R. A. Miller secretary-treasurer and director, salary $9,242 holds 50,013 capital shares ($6,540 and 29,015 capital shares) R C Goodman vice president, salary $10,583, holds no stock (no 1950 report), W. H. Meranda, vice president, salary $6,000, holds no stock (no 1950 report), R. E. Ross, comptroller salary $11,500 holds no stock (no 1950 report), Paul C Hackolt, assistant secretary, salary $1,200, holds no stock (no 1950 report) and the following directors: L C Burwell Jr.* salary $10,150, holds 472,251 capital shares ($10,830 and 50,150 capital shares) Clinton Davidson, holds 931 capital shares (no 1950 report), Alfred C Harrison holds 850 capital shares (no 1950 report), Raymond E. Harris, holds 42,097 capital shares (10,000 capital), Donald E. Hyde, holds 1,025 capital shares (no 1950 report), Paul W. Sangre holds 35,234 capital shares (33,700 capital); *Resigned as president November 30, 1951

▶**Helicopter Air Service, Inc.**—T H Reidy president, treasurer director salary $12,000 bonus $3,000, holds 19,375 common shares ($12,000 and bonus and 19,375 common) | C W Moore, vice president-operations salary $8,700 and no bonus holds no stock 187,950, no bonus and no stock) | C E Cassna secretary and director, no salary, no bonus, holds 350 common shares 1250 common), T C Rodmon, director, no salary no bonus holds 1,675 common shares (5,975 common) | A. M Ryerson director no salary, no bonus, holds 250 Class A shares (250 class A) | S J Walker director no salary, no bonus holds 1,500 common shares (1,500 common), R. H Kiel assistant secretary-treasurer salary, $7,500 no bonus holds no stock ($5,504 no bonus no stock)

Survey Sees Airline Growth Possibilities

Projection to 1961 of trends in the U S economy brings the conclusion that total national output, employment and consumer expenditures are among strong growth possibilities, with the airline future bright in the transportation field

A survey of what the national economy may look like at the end of the 1951-1961 decade, in the light of past growth, has been completed by the McGraw-Hill Department of Economics, of which Dexter M Keezer is director Included is comment on the possible future place of the airlines

Prospects cited, Keezer explains, are not forecasts, firm predictions or indication of a smooth trend They show, rather, what can happen

▶**Economy to Grow**—The department finds that if there is no war and if at the end of the period there is reasonably full employment, the total national output in 1961, on the basis of 1951 prices, will be about $380 billion of goods and services, 16% more than 1951. Population will be up 14% to 175 million and employment up 3.5 million to 67.7 million

The projection sees business capital expenditures of about $27 billion in 1961 against $24 billion last year, consumer expenditures of about $255 billion, or $50 billion higher than 1951, and a 20% gain in construction activity to approximately $36 billion

Growth of the economy, the study states, depends on growth of the population, particularly the working population, the amount of time labor is at work, and productivity, or effectiveness of work. Resources and tools, and the energy and skill with which the latter are used, help to determine productivity

▶**Airline Future**—The decade ahead of the airlines will be one of "remarkable growth," the report says, with the possibility that air passenger-miles and the volume of air cargo both may double Of all forms of transportation, aviation alone continues to make rapid technological advances

Safety and reliability of service are being improved by all-weather flying devices Time savings even on medium range flights should come with perfection of turboprop or jets And with these advantages, airlines are taking an increasing share of business travel and light cargo from the railroads

There are also good reasons, the report continues, for expecting a rising volume of pleasure travel by air. People will have more leisure, and the airplane greatly increases the range and variety of vacation trips Cost of air travel promises to be an incentive

Considerable additions to airline fleets and major improvements in our airport system are indicated by the prospective increase in traffic Federal programs already call for more than $1 billion for improvement of navigation aids and another $1 billion for airport construction during the next decade. New planes will be needed not only to

carry more passengers but to replace slower types now in use.

▶ **Copters Coming**—Widespread use of helicopters to take passengers from downtown terminals to airports and between metropolitan centers not widely separated also can be expected in the next 10 years.

For a comparable growth in personal plane use, the study finds, there must be improvements in safety and a considerable reduction in cost of planes.

Expenditures on personal transportation, by plane or automobile, are likely to grow rapidly, with increased leisure promoting short-range travel and longer trips.

Highway traffic, while it can be expected to grow rapidly, will not do so as spectacularly as air travel. Passengers and freight will be diverted from the railroads to cars and trucks as highways are improved. Railway service can be speeded by addition of diesel locomotives and modernization of terminal facilities, but the growth trend favors air and motor transport.

West Coast Airlines Mail Rate Is Set

Civil Aeronautics Board has decided that the final mail rate of West Coast Airlines is not too high, although the Board considered cutting it as of last Jan. 1. Reduced route mileage and changed expense outlook mean that while West Coast's base rate remains the same, the effective rate is reduced from 58 cents to 46 cents a revenue mile, compared with forecast break-even need of 41.33 cents.

"Although the rate in effect prior to the institution of this proceeding yielded the carrier a return on investment above the 8% generally allowed for a future period, the same rate will not be excessive for annual periods on and after Jan. 1, 1952," CAB said.

A change in West Coast's routes has automatically cut the effective rate received and has saved carrier expenses.

West Coast estimates that costs have risen $24,109 for fuel, $42,946 for wages, $8,178 for maintenance and $16,000 for miscellaneous.

The Board estimates that of the $628,961 Post Office will pay the airline this year, $20,500 will be compensation for mail service and $608,461 for subsidy.

Base rate remains 76.90 cents a mile for 2,850 mi. a day, with sliding scale based on a 25% load factor.

All-Cargo Atlantic Routes Are Denied

Civil Aeronautics Board's decision of a year ago denying two nonscheduled airlines permission to operate scheduled all-cargo service to Europe and the Middle East has been approved by President Truman.

CAB's chief argument in denying applications of Transocean Air Lines and Seaboard & Western Airlines was that the two companies could not afford to operate the proposed service unless subsidized. Then the Board added that the proposed low rates are below cost and "adversely affect the establishment of that sound air transportation system which we are charged to develop and preserve."

The Board then cited "the delicate balance in our civil aviation relations with . . . foreign countries." CAB said that to grant any part of the petitions "might jeopardize not only the operations of U. S. scheduled carriers . . . but also . . . relations with such foreign countries."

The decision was signed Feb. 9, 1951, and the President approved it 15 months later, May 10, 1952.

Another company, European-American Airlines, is seeking CAB certification for a trans-Atlantic shuttle service that would not be burdened by extensive route service and diplomatic negotiations inherent in Seaboard's and Transocean's applications. This case is slated for Board decision by July 4.

Airlines Expand Italian Services

(McGraw-Hill World News)

Rome—Foreign airlines are stepping up their services to Italy considerably. British European Airways is setting the following weekly schedules for its new Airspeed Ambassador from Rome: 63 flights to London, 12 to Nice, nine to Malta, 14 to Athens, seven to Istanbul and to Tripoli Bengasi. There will also be seven departures for London from Milan and three for Malta from Catania.

Swissair has scheduled six weekly services from Rome to Nice and Geneva, two of these being reduced rate night flights, and is introducing its Convair Liners on three weekly Rome-Milan-Zurich services.

Air France, Sabena and the Egyptian airline Saide are also contemplating expansion of their Italian services.

Canada Gets First All-Cargo Airline

Canada's first certificated all-cargo airline, Dorval Air Transport, started operations Apr. 25 with one C-46 bought from Slick Airways.

Slick holds a minority interest in Dorval and is helping set up the operation. More planes will be added to the fleet "in the near future," Slick says. Two Slick officers are on the Dorval board of directors—W. E. Hollan, executive vice president, and John W. Walbert, assistant secretary and legal counsel.

Canadian air freight previously has gone by passenger airline or by charter companies using mostly light planes.

CAB Slashes TWA Atlantic Mail Pay

Civil Aeronautics Board has cut TWA's temporary trans-Atlantic mail pay from $9 million a year to less than $4 million. TWA argued that the Board was optimistic about 1952 revenues. But the CAB examiner and the Board itself stuck to their estimate that TWA would need no more than $3,268,000 mail pay to break even, plus an extra $600,000 to cover last year's flood loss.

The Board opinion adds that "there is considerable possibility the carrier already has been overpaid by several millions of dollars." CAB's Bureau of Air Operations counsel says TWA was previously overpaid by $7 million. The Board doesn't say how much TWA may have been overpaid in the past, but says the possible overpayment means

that break-even pay is all TWA should get on its temporary rate.

Although the Board award includes $600,000 extra for the 12 months ending this June for the flood damage to the company's Kansas City maintenance base last year, the examiner had proposed amortizing that loss for five years.

So the Board increases the examiner recommendation of $3,388,000 annually to $3,868,000 to June 30, this year, and reduces it to $3,268,000 annually thereafter until a final mail rate is set.

The mail rate formula set by the Board is 0.9 cent per available seat mile flown July, 1951, through June, this year, and .76 cent thereafter.

BOAC Ends Fiscal Year With Profit

British Overseas Airways Corp. reports the first net profit of its history for a fiscal year. BOAC says it cleared $750,400 for the 12 months ended Mar. 31, this year, compared with a loss of $12,782,000 a year ago and a loss of $21,817,600 for the previous fiscal year.

Holding down seasonal losses in the first quarter this year was a "big factor in pulling us over the rocks," according to Sir Miles Thomas, BOAC chairman. BOAC reports a first-quarter loss of $663,600 this year, compared to $3,942,400 a year ago.

TEA Ups Fares 20%

(McGraw-Hill World News)

Melbourne—Rising fuel costs are responsible for Tasman Empire Airways increasing its passenger fares by 20% and its air cargo tariffs by 10%, say TEA officials. The hikes went into effect May 12.

Longer Fuselage Design for Comet

De Havilland Aircraft Co. is designing a longer Comet fuselage for an unnamed foreign airline that wants to buy the jet airliner.

Higher power of coming engines should give the longer Comet III the same 500 mph. expected of the Comet II.

Original airframe capacity of under 50 passengers is small for money-making payload, many airlines contend.

The Mark III Comet may have gross weight of 130,000-135,000 lb. compared with 105,000 for the Mark I and 115,000-120,000 for the Mark II. The low wing loading of the present Comet should allow plenty of stretch for subsequent designs like the Mark III. Comet wing loading of 50 lb. compares with more than 80 for the Stratocruiser and 70 for the DC-6B.

Cuban Cargo Line Registers Profit

(McGraw-Hill World News)

Havana—The Cuban freight airline, Aereo Expreso Inter-Americano, S. A., has recorded a $60,303 profit for 1951, a gain over the carrier's first good year, 1950, when it came out $39,944 ahead.

Last year the airline transported 14,465,000 lb. of airfreight compared with 9,844,146 lb. the previous year.

Expreso Aereo began operations in 1945 and flies between Havana and Miami, although it also has permits to serve Honduras, Guatemala, Nicaragua, San Salvador, Costa Rica and Panama Service, including flying of passengers to these points, is contingent upon acquisition of new aircraft.

DC-3 RETRACTABLE TAIL WHEEL

Thus Standard Oil Co. Douglas DC-3 has been fitted with a retractable tail wheel installation similar to that on the Super DC-3. Modification was made by Grand Central Aircraft Co., Glendale, Calif. The Standard Oil DC-3 will be used in Sumatra.

Aeronautical Research Engineers

Several positions are available for engineers who desire research work in the field of transonic aerodynamics. Applicants should have a background which includes a knowledge of compressible flow aerodynamics. These positions are open to engineers having a real desire and aptitude for original thinking and experimentation. Above all, an applicant should have a desire to learn by his own and by group effort. The work involves the fundamental aspects of flow problems and practical application of the knowledge so obtained to the problems of high-speed flight.

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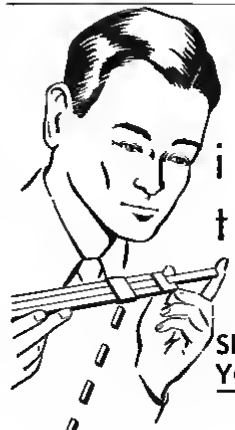

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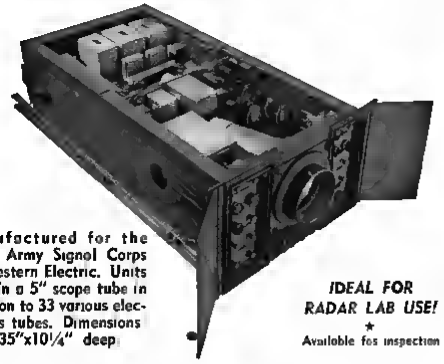

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700	TFD 6600	Thompson	Fuel Booster Pump
125	D7816	Adel	Anti Icer Pump
30	2F771 A	Pesco	Fuel Booster Pump
250	AN4014	Erie Meter	Wobble (D-3) Pump
300	1H850-K 8 KA	Pesco	Hydraulic Pump
15	AN5531-1	G E	Tach. Generator
1000	AN5780-2	G E	Wheel & Flap Position Indicator
400	AN5780-2	Weston	Wheel & Flap Position Indicator
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10	4622	Lewis Eng.	Air Temp. Ind
31	47821	Lewis Eng	Temperature Ind
18	4785	Lewis Eng	Temperature Ind
20	47823	Lewis Eng	Temperature Ind
36	47824	Lewis Eng	Temperature Ind
10	78 72	Lewis Eng	Air Temp Ind
11	78 8c	Lewis Eng	Temperature Ind
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59	0655-D	Aro	Oxygen Regulator
148	PG20RAS1	Minn. Honeywell	Air flow Switch
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38	U6905-DVS	United Air Prod.	Oil Temp. Reg. 5°
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SO THEY TELL US

(AVIATION WEEK's *full time editorial staff, largest in aviation journalism, talks to scores of authoritative people every week. Few days ago William Kroger, Assistant Managing Editor, was in Frankfurt and Paris after visiting London, on the other side of the world George Christian, Equipment Editor, was taking notes in Hong Kong and Formosa. Now he's in Korea. In the U. S., the Washington and New York staffs were putting the issue together. Phil Klass, Avionics Editor, was covering the IRE convention in Dayton. The editor was in Washington. In this column, to appear frequently, we shall print miscellaneous intelligence—"So They Tell Us"—culled from interviews.*)

Foreign

In Britain, the presence of more USAF units has revived the World War II British public opinion that these Americans are "over paid, over-dressed, and over here." AF PIOs in Britain say it's one of their big jobs to keep the resentment within bounds. That may be a major reason for prompt grounding of F-84s after a recent crash. British skies are raining Meteors but the British look differently on crashes of U. S. planes.

The only paved landing strip in Jugoslavia, according to one U. S. aircraft industry representative who visited the country recently, is at Belgrade. It's 1,000 ft. long. Planes start their takeoff runs on sod, scoot onto the concrete, and take off.

BEA's 32-seat Pionair (converted DC-3) is the second highest revenue earner in the line's fleet, Peter Masefield told Kroger, although only a few went into service last year. BEA (with Air France) starts aircoach service (Europe's first full-fledged coach operation) this fall between London and Paris.

In Wiesbaden, we were told the Russians, or Czechs, thoroughly disassembled the F-84 that landed by mistake at Prague Airport, before returning it to our Air Force. "And they didn't do too good a job putting it back together." Air Force people said. We were also told the plane definitely and positively did not have the new Sperry A-1 gunnery sight. Instead, it had a World War II model.

In Paris for the first couple of weeks after trans-Atlantic tourist service started, westbound planes were leaving with a dozen or even fewer passengers in the big 32-seat PAA DC-6Bs and 60-seat TWA Connies. Main reason: Eastbound tourists generally stay in Europe two or more weeks and hadn't started to go home yet. And relatively few Europeans can afford to come here.

Fuel restrictions have brought some tough problems on trans-Atlantic routes. Sample: Unable to fill tanks at either New York, Boston, London or Paris, carriers can take aboard in some cases only enough gas to reach Gander, Shannon or The Azores. And they can't even start out until they are sure these fueling points will be open. Stephenville, alternate for Gander, is a USAF base, and during the fuel shortage will not let airlines tank up at their pumps.

In Paris, French insiders tell us that the Avro delta-wing bomber has made its first flight, powered by four Bristol Olympus engines developing 10,000-12,000 lb. thrust each. It weighs about 190,000 lb.

Domestic

Closest friends of Gen. Vandenberg tell us they are gravely worried about his condition following a serious operation in Washington. The New York World-Telegram and Sun says radium treatments are being given.

Air people just back from Japan expect rapid growth of that country's international airline network in the next five years, including a request to be made of this country for reciprocal rights for a trans-Pacific operation. Japan has already set up a civil air attache in Washington.

American Airlines is reported to be the first major U. S. airline to prohibit three-engine ferry takeoffs, even by chief pilot or other executives, in the interest of safety for both flight personnel and citizens on the ground in vicinity of airports.

It's a sure bet, so they tell us in Washington, that the Marines eventually will fight to get control of their own aircraft procurement if they win membership on the Joint Chiefs of Staff. The latter battle would appear half won with House passage of such a bill. Some puzzled observers are now asking whether the Artillery will plug for JCS status too.

Some flight engineers say they wouldn't be surprised at a nationwide flight engi-neers' strike this summer.

Sen. Bricker says he's gathering all available background information on alleged shortcomings of CAA in administering aviation safety.

STRICTLY PERSONAL

AERODYNAMICS OF A POLITICIAN

By William P. Murden, Jr.

The North American Politician has aerodynamic characteristics subtly different from those in conventional craft. The most amazing anomaly is that drag contributes positively to his progress.

Drag may be induced drag or parasite drag, and the addition of television instrumentation has indicated the existence of profile drag. While the theory is incomplete, it appears that drag is closely associated with circulation.

It also appears that the greater the drag, the more weight the Politician carries.

The attitude of the Politician is frequently difficult to determine, so that it is not always possible to ascertain whether the Politician is stalling.

Stalling is further complicated by the fact that the right wing and left wing frequently have completely different attitudes. Most observers have concluded, however, that the left wing has less stability than the right wing.

(Politicians, like the rest of us, have discovered that you can't fly on one wing.—[ED. NOTE].)

Flutter must be treated by considering many degrees of freedom. The number usually specified is four.

Response to gusts is unpredictable, especially in the transonic region where the density is such as to form an almost impenetrable sonic barrier.

The Politician is normally powered by an internal combustion engine, utilizing gas; however, some models have been observed letting off steam, and it appears many Politicians operate on the reaction principle.

Radio control has been attempted with questionable success.

The Politician has a long range and high ceiling, even when visibility is quite limited.

Boundary effects are of great importance, high pressure usually being associated with boundaries.

This may make the Politician soar and is certain to create turbulence.

This problem requires further study, especially from the viewpoint of the Politician as a foil, and from the standpoint of control.

(*Thanks to C. D. Pengelley, chairman of Engineering Mechanics at Southwest Research Institute, San Antonio.*)

* * *

A True Story

Burbank, Calif.—A delivery boy rode his motor scooter down a road that skirted the Lockheed Air Terminal here just as a C-97's engines were revved to full power for takeoff. Boy and scooter were blown clear across the road. Both suffered minor damage.

* * *

If I had the wings of a Comet
Far, far, far away would I fly,
I would fly to the land of Mahomet,
And buy me a harem, and die!
—*The de Havilland Gazette*

ADVERTISERS IN THIS ISSUE

AVIATION WEEK—MAY 26, 1952

SEARCHLIGHT SECTION

(Classified Advertising)

T. H. Ellis, Mgr.

EDITORIAL

Bricker Urges Crash Inquiry

Ohio's Sen. John W. Bricker (R.) is the latest member of Congress to show alarm at conditions in CAA adversely affecting aviation safety. AVIATION WEEK has been reporting on inefficiency in CAA's office of Aviation Safety for several months. Mr. Bricker, formerly governor of Ohio, and once a Republican candidate for Vice President of the United States, made the remarks below on the floor of the Senate Apr. 24. We think they justify detailed reporting. The CAA medical personnel involved are in the Office of Aviation Safety, headed by Ernest Hensley and William Davis.—R.H.W.

Mr. President, I feel that it is essential to bring to the attention of the Senate . . . a matter which has come to my attention. I have not been able to obtain legal verification or sworn testimony in regard to the facts in relation to this matter, but they are of such a critical character that I feel impelled to bring them to the attention of the Senate. I believe all of them to be true. I hope an explanation will ultimately be forthcoming. . .

Sometime early in the morning of April 18 a transcontinental passenger plane from New York City, operated by the North Continent Airlines, and carrying a crew of 3 and 26 passengers, crashed into a hillside in the suburbs of Los Angeles, Calif. All those on board were dead when the wreckage was found. I have evidence, which I believe to be true, revealing that one of those on board, the pilot, may have died before the plane hit the ground.

Immediately upon learning of the accident, the CAA in Washington ordered the North Continent Airlines, a non-scheduled passenger carrier, to suspend further operations at once. The CAA based the order on "an operating history involving violations of Civil Air Regulations." This is an all too familiar pattern.

The pilot of the North Continent Airlines plane, which crashed in California, was Louis Powell, a man of 41 years of age. I am reliably informed that the coroner's report after a post mortem on Mr. Powell discloses that he died of a heart attack and not as a result of any injuries received in the crash. I like-wise have reason to believe, Mr. President that the officials charged with the enforcement of air safety regulations in the CAA should have known that just such a tragic occurrence might happen with Mr. Powell at the controls.

Powell was given a complete physical examination approximately 1 year ago. This examination was made by Dr. Francis S. Hertzog a designated medical examiner for the CAA, in Long Beach, Calif. An electrocardiogram was made in connection with this examination. The report on this physical examination, including the electrocardiogram, was first sent to Dr. Fred Ellis, the acting regional medical officer of the CAA for the Sixth Region. Dr. Ellis, after studying the record, sent it to Dr. John Smith, chief of the Physical Standards section of the Medical division of CAA, here in Washington. I understand that Dr. Smith, who is recognized as an outstanding physician in cardiology, wrote a letter stating that in his considered opinion Powell or any other individual suffering from the same ailment should not "be issued any type of medical certification." The letter contained a formal recommendation against the issuance of medical certification for Louis Powell.

Dr. Fred Ellis, on receipt of Dr. Smith's letter recommending against any type of license to Powell, wrote in turn to Dr. Hertzog, who made the initial examination. He informed Dr. Hertzog that he was issuing a certificate to Louis Powell limiting him to company check pilot duty. Ellis stated in his letter that men suffering from the heart ailment shown by the physical examination of Louis Powell should not be issued a certificate which would either put them in command of aircraft or permit them to pilot aircraft passengers.

In order to insure against misuse of this limited operating license, the words "company check pilot duty" were stamped on the face of Powell's operating license. This operating authority allowed Powell to fly company aircraft with accredited company personnel only for check purposes. Even this limited authority seems to me to be totally unwarranted. While the immediate risk may have been confined to Powell and the company officials who flew with him, they were not the only parties in interest, as the residents of Elizabeth, N. J. and other residential areas where airplanes have crashed, can well bear witness.

Therefore, Mr. President, at the very time when the twin-engined Curtiss Commando of North Continent Airlines crashed into a hillside in California, the man at the controls held no valid operating authority. What is more shocking Mr. President, is that this fact is true despite the recommendations of three competent medical examiners, who were unanimous in declaring that Powell should not have been permitted to pilot aircraft carrying passengers for hire. At least one of these, the outstanding cardiologist among them, recommended against the issuance of any type of flying permit for Powell.

Mr. President, this case seems not to be an isolated one. I have information which I believe to be reliable that it is not. I understand that among commercial pilots there are two classes of medical certification. The first-class certificate covers the pilot of regularly scheduled passenger aircraft. A little more than a year ago, it was determined that, as a result of a number of accidents on non-scheduled airlines, pilots of such lines were also to meet the same physical standards covering first-class certificates.

The Class 2 certificate covers many different types of operators, including pilots who fly cargo planes, charter planes, crop dusters, and the like. Co-pilots are included in this category.

In the last 3 years there has been a relaxation of the physical standards required for aircraft pilots. This has resulted, I am informed, in the waiver of certain defects which in my judgment should disqualify the individuals concerned from piloting aircraft. I am informed that at this very moment there are at least 33 diabetics who are certified to fly in one capacity or another. I am told that one diabetic has a first-class certificate.

A man suffering from diabetes runs the risk of suddenly and without warning going into shock or even coma, or experiencing mental disturbances of varying degrees. The authorities who have drafted international air regulations recognize that a diabetic may without warning be unable to think properly, to react properly or even be subject to suicidal tendencies. International regulations bar issuance of a license to diabetics. As I have pointed out before, Mr. President this awful risk is shared not only by the pilot and the passengers he may carry, but by the unsuspecting victims who live under the umbrella of fear which so vividly describes the situation in residential areas near our great airports—and we are not excluded here, in Washington.

There are other physical impediments which have, to my knowledge, been waived. . .

Mr. President, the men who drive trucks in interstate commerce on the highways of this nation are subject to higher physical standards than the examples I have mentioned. The motor safety regulations of the ICC provide that—

First. No permit shall be granted to any person with an impairment of function of any extremity.

Second. No permit will be granted to any person who has suffered the loss of an eye, or where vision is far below normal.

Third. No permit will be granted to any person known to be a diabetic.

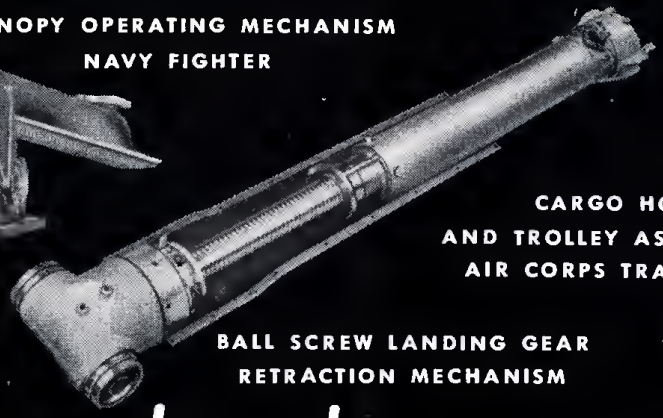
Fourth. No permit will be granted where there is any history of a heart condition, mental condition, nervous condition, or any other disease likely to interfere with safe driving.

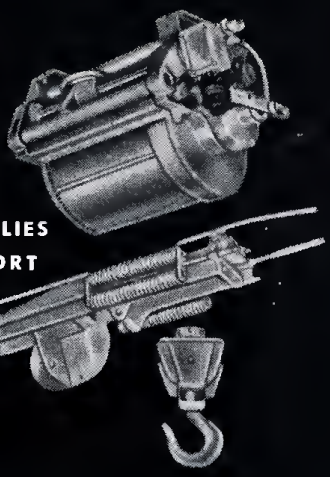
I do not believe, Mr. President, that there is any case in which the ICC has deliberately waived these requirements.

In short, Mr. President, the cab of an interstate truck is barred to the lame, the halt, and the blind. Surely there is even less reason to permit him to enter the cockpit of a plane. . .

I think the time has come when Congress must take note of the serious situation which prevails. One airport has been closed and the North Continent Airlines Co. has now been closed down. But such action is too late, when these serious accidents have already happened. If there has been a relaxation of the rules on the part of the CAA or of the CAB—and I believe there has been, otherwise I should not have brought up the matter on the floor of the Senate—then certainly it is time for the Congress to act. . . . I hope that many of the supposed facts may be disproved when a thorough investigation is had, but the necessity of such an investigation is apparent.

CANOPY OPERATING MECHANISM
NAVY FIGHTER

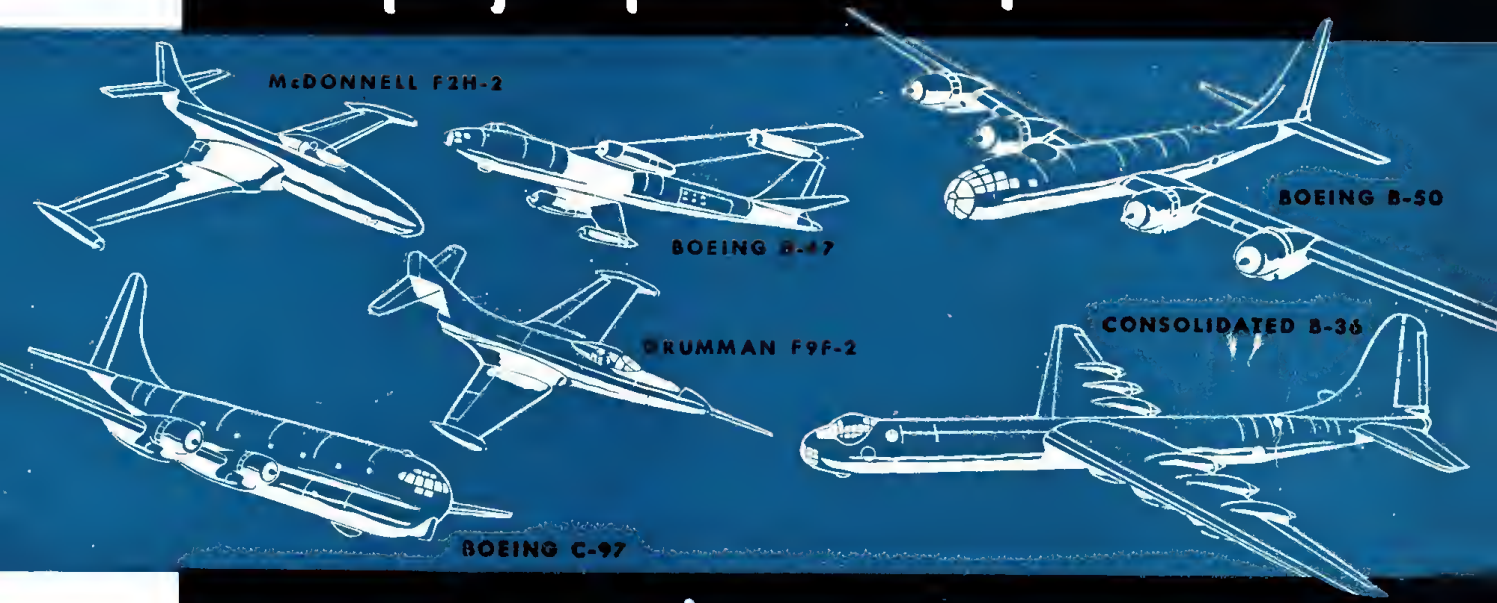




CARGO HOIST
AND TROLLEY ASSEMBLIES
AIR CORPS TRANSPORT

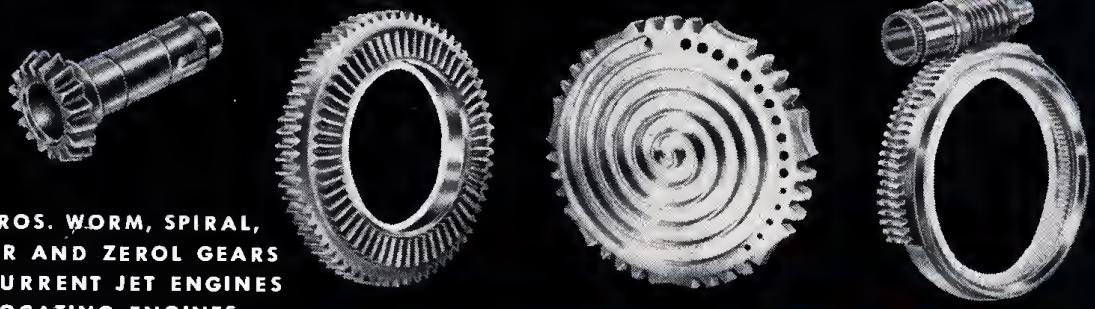
BALL SCREW LANDING GEAR
RETRACTION MECHANISM

Helping keep them on top



gears and actuators

MANUFACTURED BY Foote Bros.



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